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CIMMYT Maize

A user's manual for fieldbook 5.1/7.1 and alpha

Banziger, M.

1999

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User's Manual for Fieldbook 5.1/7.1

Program for managing

pedigrees, data, and fieldbooks

for a maize breeding program

and Alpha

Program for creating

and analyzing alpha

lattice designs

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CIMMYT

Sustainable Maize and Wheat Systems for the Poor

The Maize Program

User's Manual for
Fieldbook 5.1/7.1

Program for managing

pedigrees, data, and fieldbooks

for a maize breeding program

Developed by Marianne Bänziger

and
Alpha

Program for creating

and analyzing alpha

lattice designs

Interface developed by Hector Barreto,

based on the algorithm developed by BioSS

(Biomathematics & Statistics Scotland)

The Maize Program

CIMMYT

CIMMYT is an internationally funded, nonprofit scientific research and training organization. Headquartered in Mexico, the Center works with agricultural research institutions worldwide to improve the productivity, profitability, and sustainability of maize and wheat systems for poor farmers in developing countries. It is one of 16 similar centers supported by the Consultative Group on International Agricultural Research (CGIAR). The CGIAR comprises over 55 partner countries, international and regional organizations, and private foundations. It is co-sponsored by the Food and Agriculture Organization (FAO) of the United Nations, the International Bank for Reconstruction and Development (World Bank), the United Nations Development Programme (UNDP), and the United Nations Environment Programme (UNEP). Financial support for CIMMYT's research agenda also comes from many other sources, including foundations, development banks, and public and private agencies.

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FIELDBOOK

Hardware requirement: PC with at least a 486 processor and 16 MB ram.

Software requirement: Microsoft EXCEL® 95 or later versions of Microsoft EXCEL®.

Necessary disc space for programs: 700 kB.

ALPHA

Hardware requirement: PC with at least a 386 processor and 8 MB ram.

Software requirement: MS-DOS.

Necessary disc space for programs: 2,200 kBytes.

Necessary space in conventional memory for programs: 600 kBytes

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CIMMYT, 1999.

TABLE OF CONTENTS

A FIELDBOOK 3

1 INTRODUCTION 3

1.1 WHAT IS FIELDBOOK? 3

1.2 SPECIAL FEATURES 3

1.3 WHAT IS THE DIFFERENCE BETWEEN FIELDBOOK 5.1 AND 7.1? 3

2 INSTALLING FIELDBOOK 4

3 SEED PREPARATION 5

3.1 CREATING A NEW SEED PREPARATION 5

3.2 OPENING AN EXISTING SEED PREPARATION 7

3.3 SELECT ENTRIES FOR A SEED PREPARATION 7

3.4 MAKING A DESIGN FOR A SEED PREPARATION 11

3.5 CREATING SEED LABELS FOR A SEED PREPARATION 14

4 NURSERY 15

4.1 CREATING A NEW NURSERY 15

4.2 OPENING AN EXISTING NURSERY 18

4.3 MAKE A STOCKLIST 18

4.4 MAKING STOCK LABELS 20

5 TRIAL 21

5.1 CREATING A NEW TRIAL 21

5.2 OPEN AN EXISTING TRIAL 24

6 INVENTORY 24

6.1 CREATING A NEW INVENTORY 24

6.2 OPEN THE INVENTORY 25

6.3 CONSOLIDATE THE INVENTORY 26

6.4 CREATE STOCK LABELS FROM THE INVENTORY 27

7 DATA CHECK, PRINT AND CLOSE 28

7.1 DOUBLE ENTRY 28

7.2 DATA CHECK 29

7.3 PRINT 30

7.4 CLOSE 30

8 OPTIONS 31

8.1 DEFAULTS 31
8.2 CHANGE TEMPLATES 32
8.3 MODIFYING THE FORMAT OF TEMPLATES 33
9 FIELDBOOK MADE EASY – A QUICK RUN THROUGH THE SEASON 33
10 ANNEX TO FIELDBOOK 34
10.1 ANNEX 1: COMPONENT OF FIELDBOOK 34
10.2 ANNEX 2: TEMPLATE RESTRICTIONS 34

B ALPHA 38

1 WHAT IS ALPHA? 38
2 INSTALLING ALPHA ON YOUR COMPUTER 38
3 STARTING ALPHA 38
4 USING ALPHA 39
4.1 NEW RANDOMIZATION 39
4.2 ANOVA ALPHA-LATTICE DESIGN 40
4.3 VIEWING THE OUTPUT OF THE ANALYSIS OF VARIANCE 42
4.4 SELECTION ASSISTANT 42
4.5 VIEWING THE OUTPUT OF THE SELECTION ASSISTANT 46
4.6 VIEW/EDIT DATA FILE 46
4.7 TERMINATE 47
5 THE ALPHA PROGRAMS MADE EASY – A QUICK RUN THROUGH THE SEASON 47
6 IMPORTING ASCII FILES INTO MSTAT 48

A FIELDBOOK

1 INTRODUCTION

1.1 WHAT IS FIELDBOOK?

FIELDBOOK is a collection of macros for Microsoft EXCEL®, designed to assist maize breeders in aspects of fieldbook, pedigree and data management. The program manages seed preparation, nursery and trial books, updates pedigrees and keeps a seed inventory of which germplasm can easily be selected using pedigree, origin, or performance data.

1.2 SPECIAL FEATURES

- FIELDBOOK uses EXCEL menus and dialog boxes. The user can combine features of FIELDBOOK with any feature available in EXCEL.
- FIELDBOOK creates and prints entry lists for seed preparations and seed shipments, fieldbooks for trials and nurseries, and labels for seed preparations, inventory and seed shipments. Templates for master files and result sheets can be defined.
- Pedigrees are updated for different types of pollinations common in a maize breeding program.
- Performance data can be carried over to descendants of germplasm, and to the inventory and new nursery books.
- Entries can be selected based on stock ID, pedigree, origin, or performance data.
- Different randomizations for trials conducted at several sites can be created using one master design.
- Data can be checked by double entering.
- Data that deviate by more than three standard deviations from the mean can be highlighted.
- FIELDBOOK is designed to interact with the ALPHA software (publicly available software from CIMMYT) that creates and analyzes alpha (0,1) lattice designs and that contains a selection index program. FIELDBOOK does not provide an algorithm for creating designs or analyzing data.
- Data files are stored in a logical manner that permits easy localization and manipulation of files with other programs.
- LOTUS-123® design files are created for use with an HP palmtop.

1.3 WHAT IS THE DIFFERENCE BETWEEN FIELDBOOK 5.1 AND 7.1?

FIELDBOOK 5.1 is an add-in program for Microsoft EXCEL 5.0/95. FIELDBOOK 7.1 is a collection of macros for Microsoft EXCEL 97. You need to either install FIELDBOOK 5.1 or FIELDBOOK 7.1 depending on what version of EXCEL you have.

2 INSTALLING FIELDBOOK

To install FIELDBOOK proceed as follows:

1. Go to the MSDOS-prompt C:\
2. Put the installation diskette in the floppy drive.
3. Assuming that the A drive is the floppy drive, type **A:** and press **ENTER**.
4. Type **INSFBK** and press **ENTER**. This command stands for "Install FIELDBOOK". The installation will take a few seconds depending on the speed of your computer.
5. Start WINDOWS

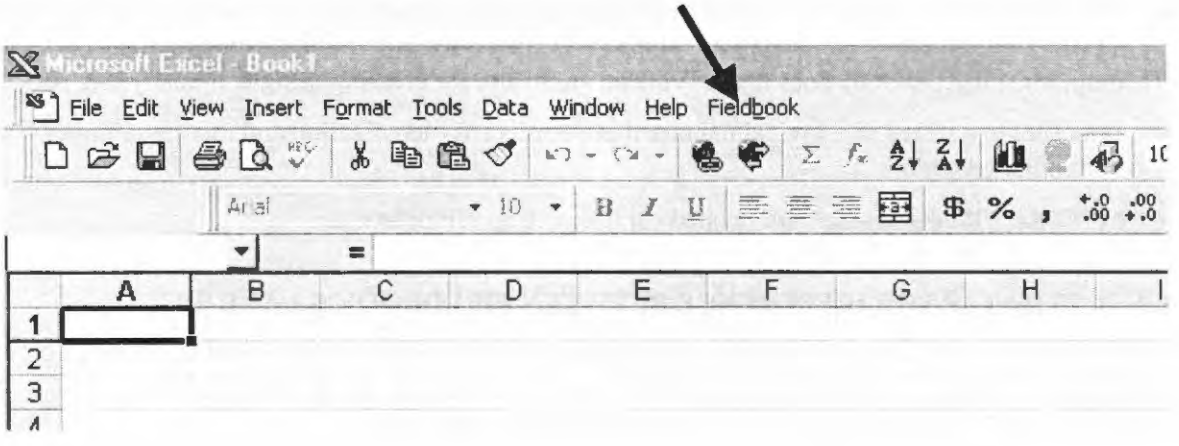
IMPORTANT: If you are installing version 7.1 of FIELDBOOK, skip steps 6 through 11.

---

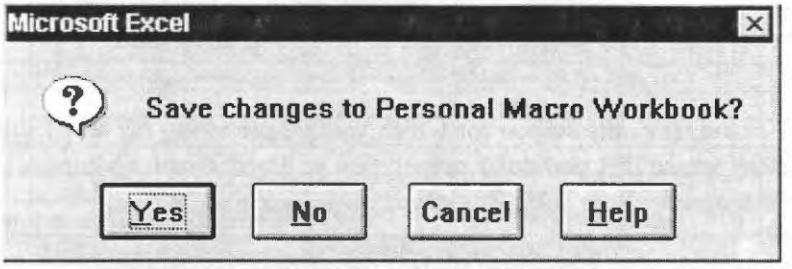
6. Start EXCEL
7. From the Tools menu, select **Add-ins....**
8. Click on the **Browse** button.
9. Select **C:\XLFBK\FBK51.XLA**
10. Press **OK**, press **OK** again.
11. Exit EXCEL (important!)

---

12. Copy PERSONAL.XLS to C:\MSOFFICE\EXCFL\XLSTART (assuming standard installation of MSOFFICE) or to the location of your EXCEL- start-up directory \EXCEL\ XLSTART.
13. The installation diskette should be kept in a safe place and should not be used for any purposes other than installing FIELDBOOK.
14. Start EXCEL
15. **FIELDBOOK** is ready on the main toolbar of EXCEL any time you open EXCEL.



16. When leaving EXCEL, a dialog box similar to the one below, appears asking you whether changes to the Personal Macro Workbook should be saved.



17. Click on **YES** to save the current settings of the dialog boxes.

3 SEED PREPARATION

The seed preparation workbook is usually the first workbook created. It receives a **Prep ID** and is allocated to a **Season**.

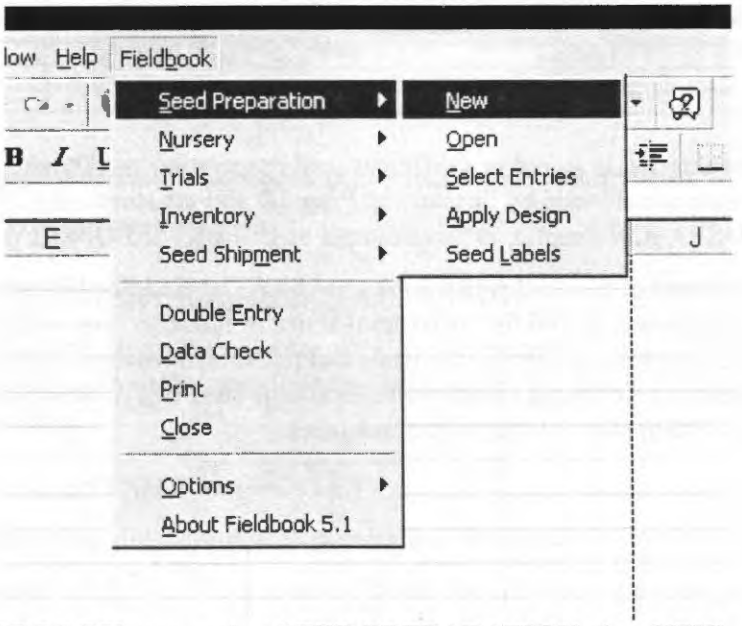
Examples for Season and Prep ID:

Season: 97A (stands for that the seed was prepared in the year 1997, season A), 97B (stands for that the seed was prepared in the year 1997, season B), etc.

Prep ID: EPOP (stands for that the seed preparation was called EPOP), etc.

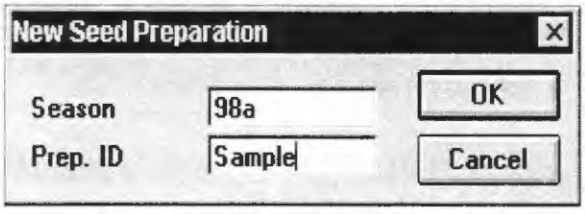
3.1 CREATING A NEW SEED PREPARATION

To create a new seed preparation, proceed as follows: -



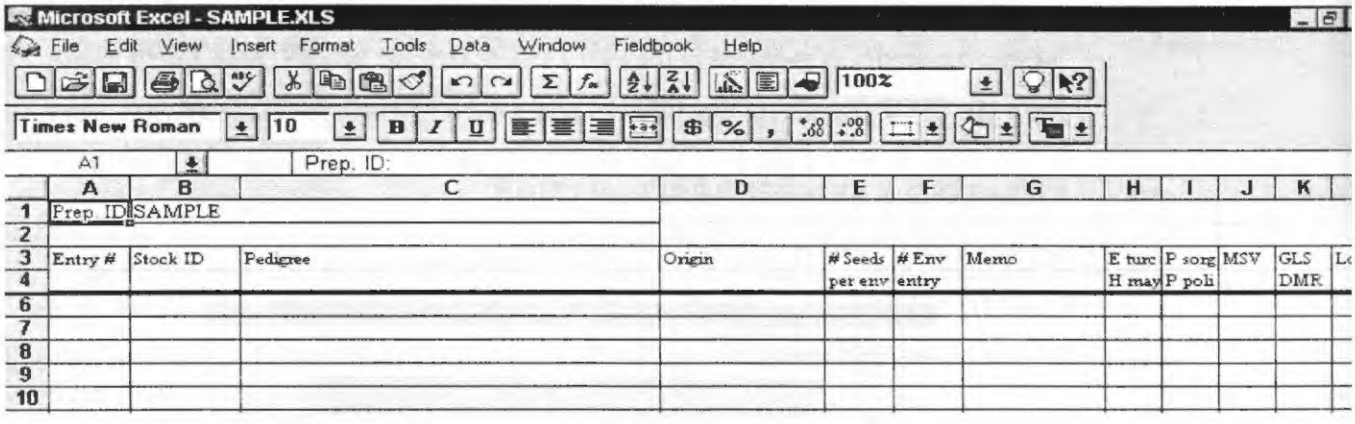
1. From the **FIELDBOOK** menu select **SEED PREPARATION,** then **NEW**.
2. The following dialog box is displayed.

3. Enter the **Season** (i.e., the season for which you are preparing the seed) and the **Prep. ID** (i.e., the identity by which this particular preparation will henceforth be known by). In this tutorial the season is **98A** and the Prep ID is **Sample**.



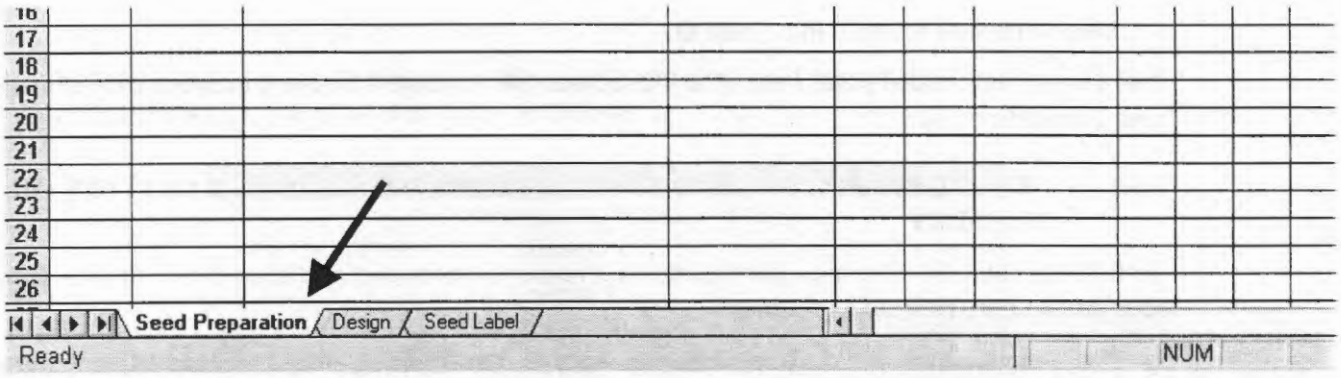
4. Select **OK**

5. You will now have a blank seed preparation workbook on the screen. In this case **Sample** (see below).



6. Each seed preparation is stored in a different seed preparation workbook. The seed preparation workbooks are characterized by Season and Prep. ID and are stored as C:\FBK \SEEDPREP\SEASON\PrepID, in this example as C:\FBK\ SEEDPREP\98A\SAMPLE.XLS.

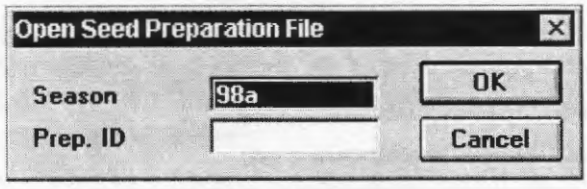
7. The first worksheet of the seed preparation workbook, labeled **Seed Preparation**, will contain the list of the entries prepared for a trial, trial series or nursery. The second worksheet, labeled **Design**, will contain the design for the trials and nurseries for which the seed is prepared. The third worksheet, labeled **Seed Label**, will contain the seed labels. Select the different worksheets by clicking on the appropriate tag of the worksheet.



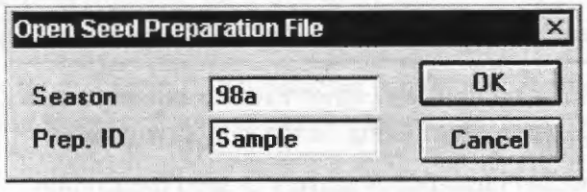
3.2 OPENING AN EXISTING SEED PREPARATION

To open an existing seed preparation, proceed as follows: -

1. From the **FIELDBOOK** menu select, **SEED PREPARATION**, then **OPEN**. The following dialog box appears:



2. Enter the Season and Prep ID. In this tutorial, the season is **98A** and the Prep ID is **Sample.**



3. Select **OK**.
4. The specified seed preparation workbook (i.e. C:\FBK\SEEDPREP\98A\ SAMPLE.XLS) will display on the screen.

3.3 SELECT ENTRIES FOR A SEED PREPARATION

This option helps you making an entry list for your seed preparation. You can either fill in entries manually, or select entries from the stocklist of an existing nursery, from the inventory or from a previous seed preparation

3.3.1 ENTERING ENTRIES MANUALLY

You can enter entries manually in your seed preparation. Proceed as follows: -

1. Enter entry number (1, 2, 3 ...) in column A. **Note:** An entry list of a seed preparation needs to start in row 6.
2. Enter Stock ID in column B
3. Enter Pedigree in column C

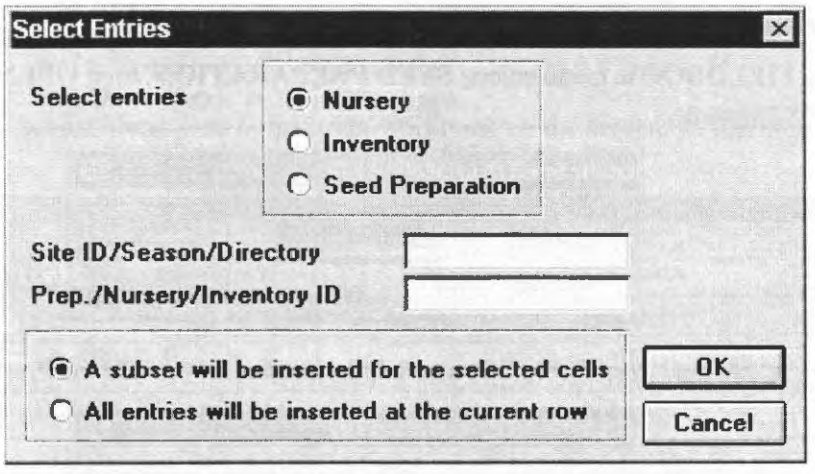
4. Enter Origin of the seed in column D.

You can as well cut and paste from other files. **Note:** Never leave a free row between entries in a seed preparation list.

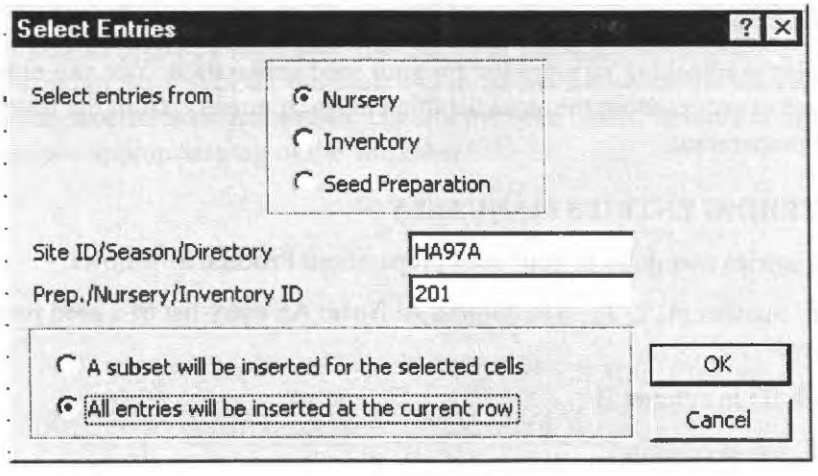
3.3.2 SELECTING ALL ENTRIES FROM AN EXISTING SEED PREPARATION OR NURSERY

To fill automatically all entries from an existing nursery or previous seed preparation in your current seed preparation, proceed as follows: -

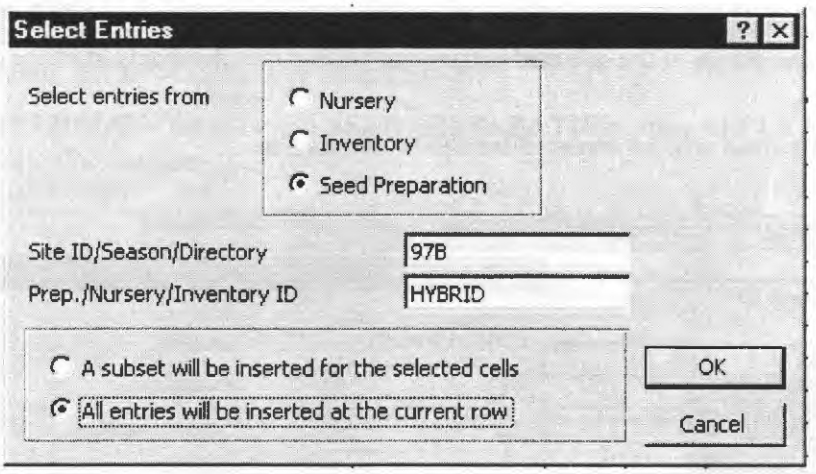
1. Position your cursor in the line where you want to start inserting entries from an existing nursery, or from a previous seed preparation.
2. From the **FIELDBOOK** menu select **SEED PREPARATION**, then **SELECT ENTRIES**. The following dialog box appears.



3. Choose whether you want to insert entries from an existing nursery, the inventory or from a previous seed preparation, by clicking on the appropriate bullet.
4. Enter the corresponding identifier of nursery or seed preparation
5. Choose **All entries will be inserted at the current row**.
6. Example: if you want to select all entries harvested from the nursery HA97A-201, fill in the dialog box as follows:



7. Example: If you want to select all entries from a previous seed preparation made in 97B and called HYBRID, fill in the dialog box as follows:



8. Press **OK**

9. FIELDBOOK opens the selected nursery or seed preparation workbook and fills in all entries that were harvested from that nursery or all entries that were prepared in that previous seed preparation **starting from the row where the cursor was placed before you selected SEED PREPARATION - SELECT ENTRIES.**

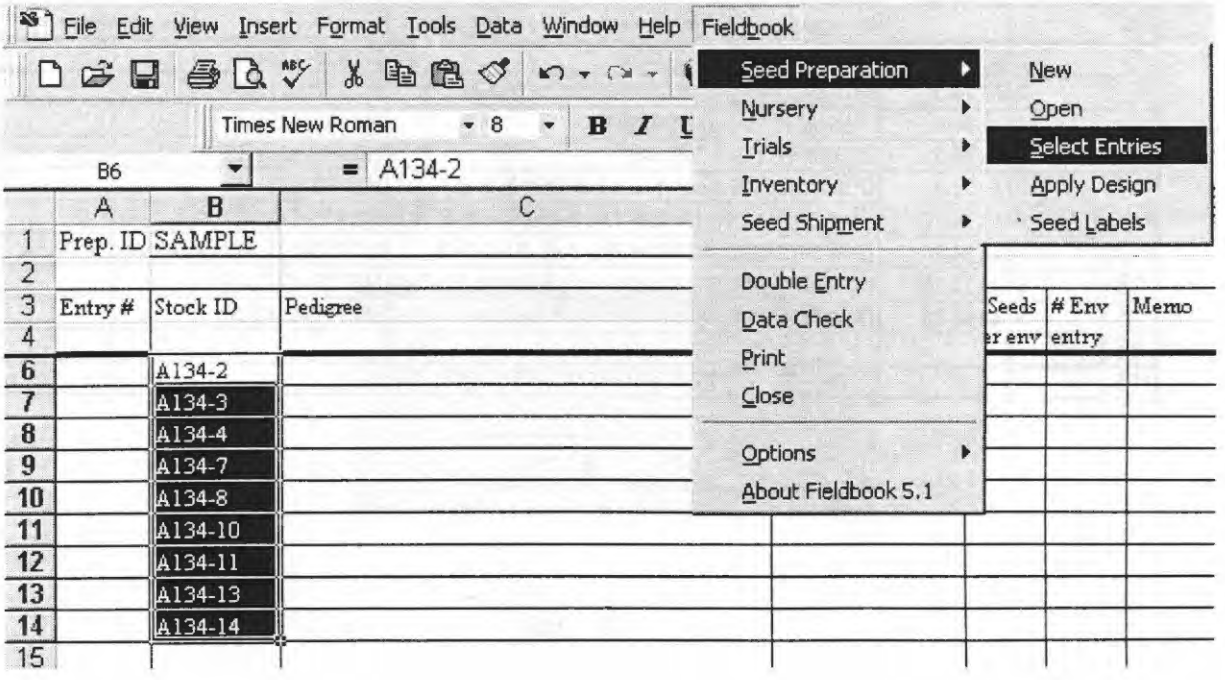
3.3.3 COMPLETING INFORMATION FOR A SUBSET OF ENTRIES

Frequently, you only want to prepare seed for a sub-set of entries for which the information is stored in a certain nursery, previous seed preparation, or the inventory. Proceed as follows: -

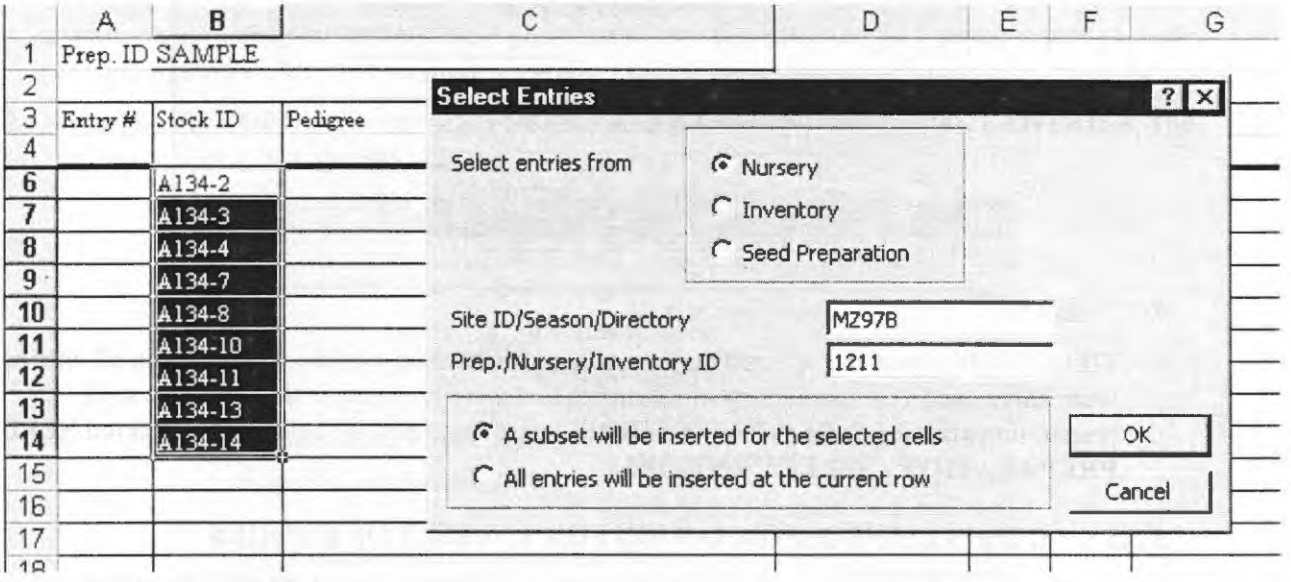
1. Enter **either** the Stock ID in column B, the Pedigree in column C **or** the Origin in column D for the entries that you want to select from a certain nursery, a previous seed preparation, or the inventory.

2. Highlight the information that you entered.

3. From the **FIELDBOOK** menu select **SEED PREPARATION**, then **SELECT ENTRIES**.



4. Choose whether the selected entries can be found in the stocklist of an existing nursery, in the inventory, or in a previous seed preparation, by clicking on the appropriate bullet.
5. Enter the corresponding identifier of nursery, inventory, or seed preparation. In this example, the pedigree and origin of the selected entries can be found in the stocklist of the nursery MZ97B-1211.
6. Choose **A subset will be inserted for the selected cells**.



7. Press **OK**
8. FIELDBOOK opens the selected nursery or seed preparation workbook and fills in the remaining information for the entries you selected.

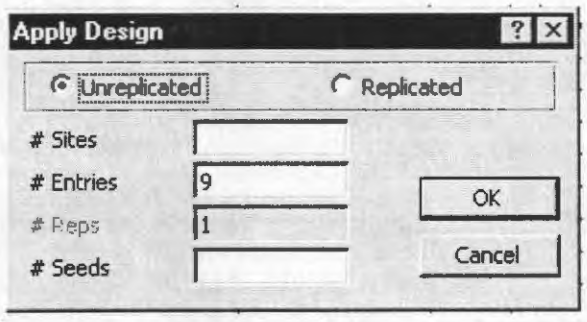
	A	B	C	D	E	F	G
1	Prep. ID	SAMPLE					
2							
3	Entry #	Stock ID	Pedigree	Origin	# Seeds per env	# Env entry	Memo
4							
6	1	A134-2	G16BNSEQC0F228-2-4-B-B-B	MZ97B-1211-4			
7	2	A134-3	G16SeqC1F47-2-1-2-1-B-B-B	MZ97B-1211-5			
8	3	A134-4	G16SeqC1FS8-1-1-1-2-B-B-B	MZ97B-1211-6			
9	4	A134-7	SPEC7F41-1-2-2-1-B-B-B	MZ97B-1211-10			
10	5	A134-8	G15C22MH131#-1-3-4-1-3-1-#-BBB-B-B-B	MZ97B-1211-11			
11	6	A134-10	[P49-SR(BC6S3)]HS#HS#-73-10-#1-B1-B-B-B	MZ97B-1211-14			
12	7	A134-11	[P49-SR(BC6S3)]HS#HS#-218-2-#1-B1-B-B-B	MZ97B-1211-17			
13	8	A134-13	[LB(1)8332-SR(BC3)]-183-1-1-1-B-B#1-1-B1-B-B-	MZ97B-1211-19			
14	9	A134-14	[PL20-SR]FS#FS#(S)-44-2#1-#1-B1-B-B-B	MZ97B-1211-20			
15							
16							

3.4 MAKING A DESIGN FOR A SEED PREPARATION

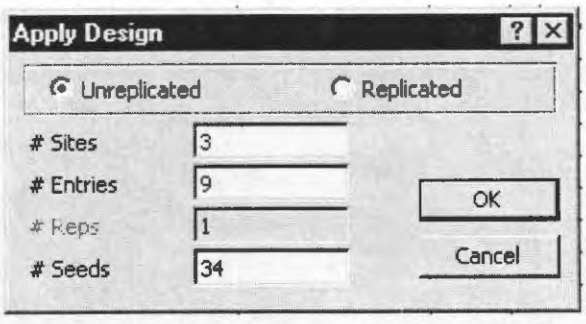
After you have completed an entrylist, you need to make a design i.e., you need to decide at how many sites you want to plant these entries, with how many reps and how much seed you need to put in each seed envelope.

3.4.1 MAKING AN UNREPLICATED DESIGN

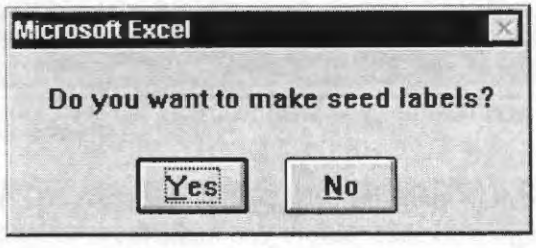
1. From the **FIELDBOOK** menu, select **SEED PREPARATION**, then **APPLY DESIGN**. The following dialog box appears.



2. Click on **Unreplicated**.
3. Fill in the number of sites where you want to plant the nursery. In this example the nursery should be planted at 3 different sites.
4. FIELDBOOK automatically detects the number of entries in your entrylist.
5. Fill in the number of seeds you want to prepare in each seed envelope. In this example, 34 seeds are prepared per envelope.



6. Select **OK.**
7. FIELDBOOK asks you whether you wish to create the seed labels at this point or you would wish to do so later.



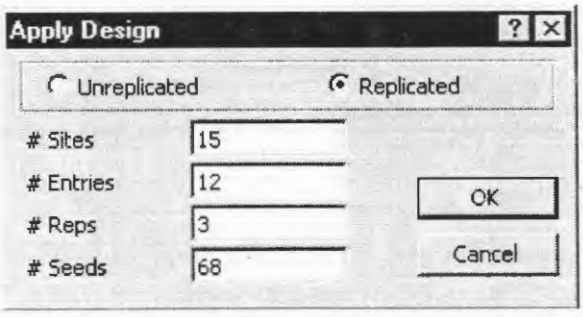
8. Press **YES** if you want to make the seed labels now, press **NO** if you want to make manual changes on the Design worksheet before you make the seed labels.

3.4.2 MAKING A REPLICATED DESIGN

Frequently you want to plant a replicated trial at several sites. FIELDBOOK relies on one externally created master design for creating different randomizations for several site. Proceed as follows: -

1. Create a master design for the trial. Write the master design using four columns:
   - Column 1: Replicate
   - Column 2: Incomplete block (if you do not use a lattice design, fill this column with any default value e.g. with 1)
   - Column 3: Plot number
   - Column 4: Entry number
2. Store the master design as an ASCII file with extension *.DSN. **Give this file the same name as the seed preparation and store it in the appropriate seed preparation subdirectory**, e.g. a master design for a seed preparation saved as C:\FBK\SEEDPREP\98A\ SAMPLE.XLS should be stored as C:\FBK\SEEDPREP\98A\ SAMPLE.DSN.

   You can create the master design using ALPHA, a publicly available software from CIMMYT that creates and analyzes alpha (0, 1) lattice designs. ALPHA stores data in a format that FIELDBOOK will easily interpret and use (see 4.4.3).
3. From the **FIELDBOOK** menu, select **SEED PREPARATION**, then **APPLY DESIGN**
4. Click on **Replicated**.
5. Fill in the number of sites. In this example, a replicated trial will be planted at 15 sites.
6. FIELDBOOK automatically detects the number of entries in your seed preparation list.
7. Fill in the number of replications. In this example the trial has 3 replicates and a master design was created with 12 entries and 3 replicates.
8. Fill in the number of seeds you want to prepare in each seed envelope, in this example 68.

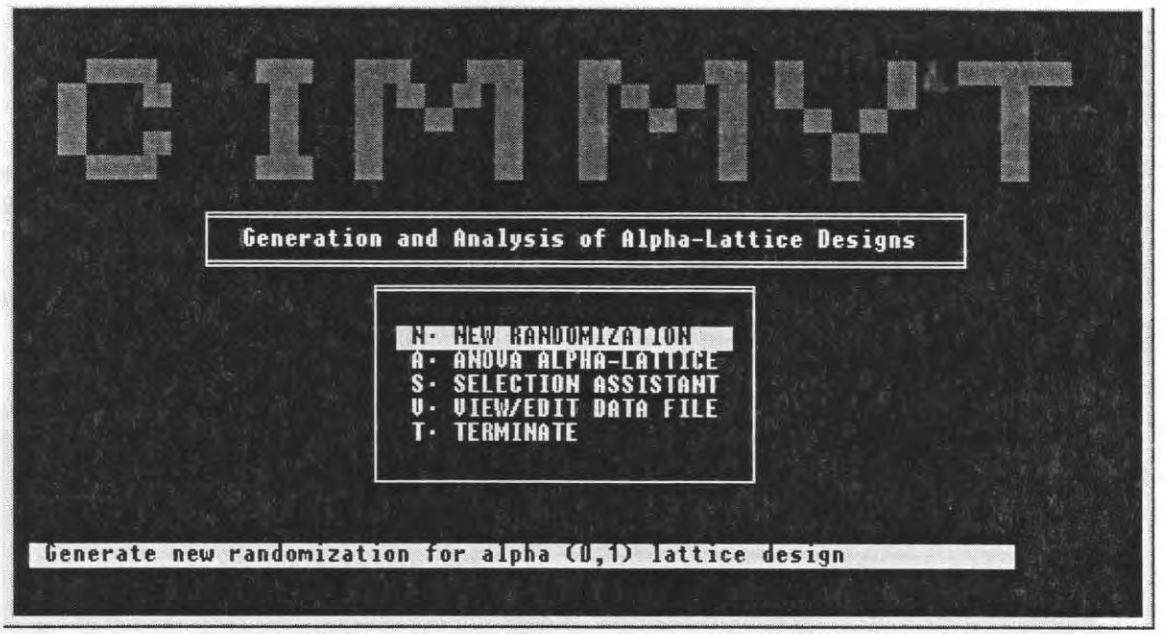


9. Select **OK**.
9. FIELDBOOK asks you whether you wish to create the seed labels at this point or you would wish to do so later.
10. Press **YES** if you want to make the seed labels now, press **NO** if you want to make manual changes on the Design worksheet before you make the seed labels.

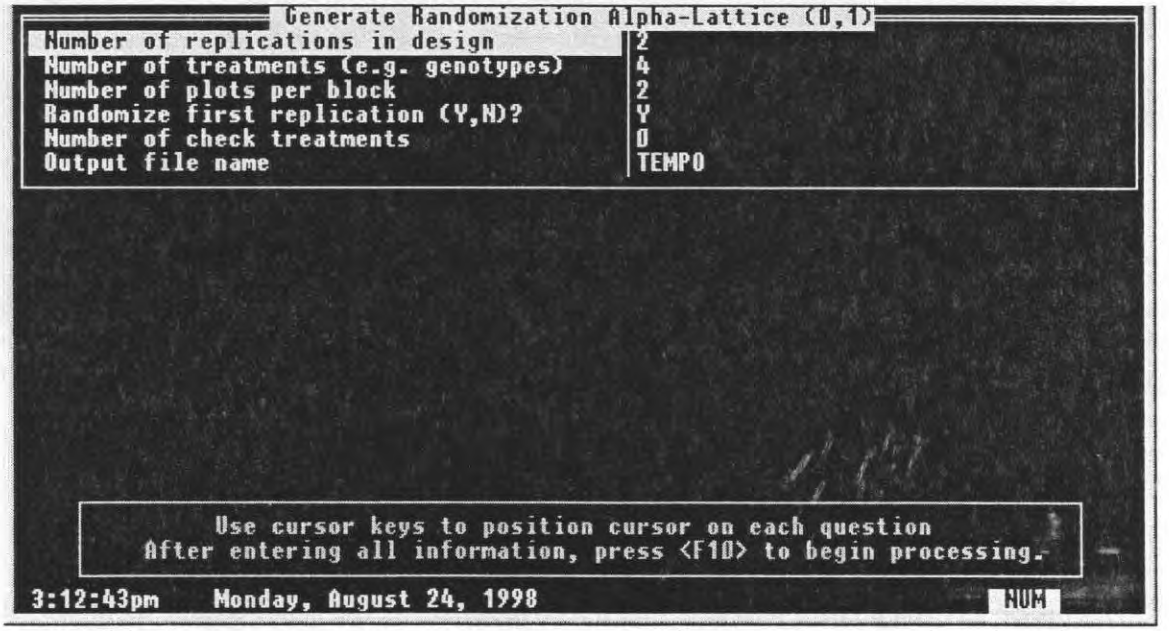
3.4.3 USING ALPHA FOR CREATING YOUR MASTER DESIGN

To use ALPHA for creating your design, proceed as follows:-

1. Exit EXCEL and go to the DOS prompt (C:\)
2. Type **CD\ALPHA** and press **ENTER**.
3. Type **ALPHA** and press **ENTER**. The following screen appears.

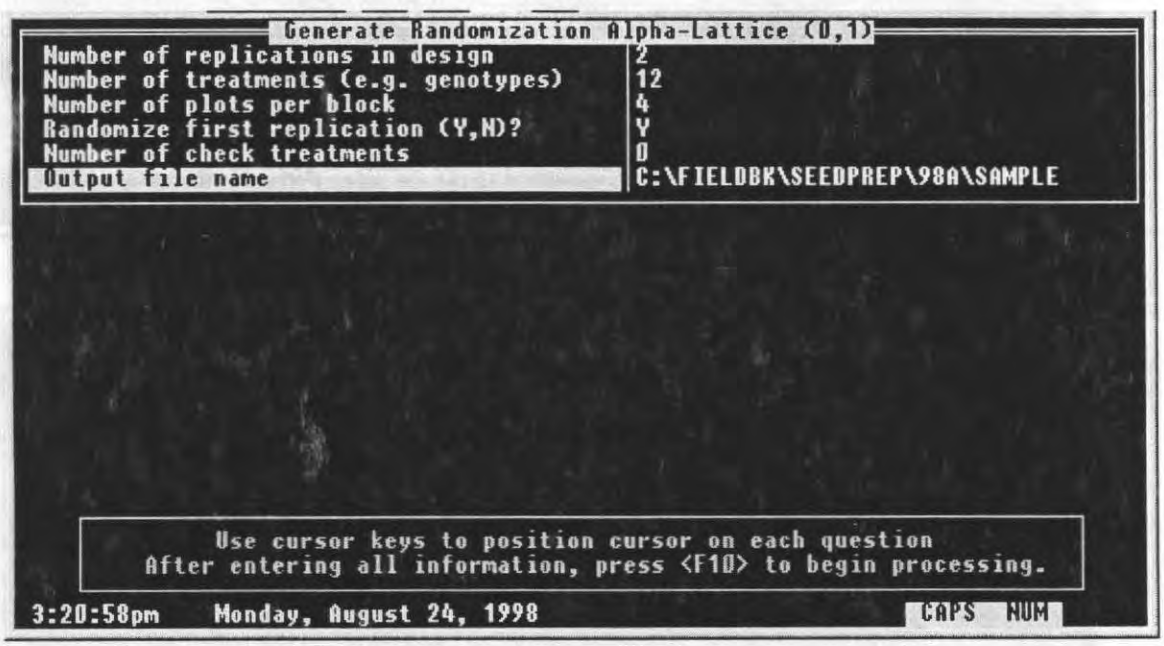


4. Select **NEW RANDOMIZATION**. The following screen appears.


Generate Randomization Alpha-Lattice (0,1)
Number of replications in design 2
Number of treatments (e.g. genotypes) 4
Number of plots per block 2
Randomize first replication (Y,N)? Y
Number of check treatments 0
Output file name TEMPO
Use cursor keys to position cursor on each question
After entering all information, press <F10> to begin processing.
3:12:43pm Monday, August 24, 1998
NUM

5. Fill in **Number of replications**
6. Fill in **Number of treatments (e.g. genotypes).** This number must agree with the number of entries in your entrylist.

7. Fill in **Number of plots per incompete block.** Use the following rules:
   - If your soil is fairly uniform, choose a block size that is near the square root or slightly below the square root of the number of genotypes.
   - If your soil is very variable, choose a block size within which you expect the soil to be fairly uniform.
   - If possible, do not choose block sizes that are less than 50% of the value you would have chosen for a fairly uniform soil.
8. Choose **Y** (Yes) or **N** (No) for **Randomize first replication Y/N?**
9. Fill in **Number of check treatments.** Assuming that the check entries in your trial are the first entries in the entry list, enter the number of checks in your trial. If your check entries are not the first entries in the entry list, or if you do not have check entries in your trial, enter "0" (zero) in this line.
10. Fill in the **Output file name**. This Output file should have the same name as the seed preparation and it should be created at the same location as the seed preparation e.g \FBK\SEEDPREP\98A\SAMPLE See below

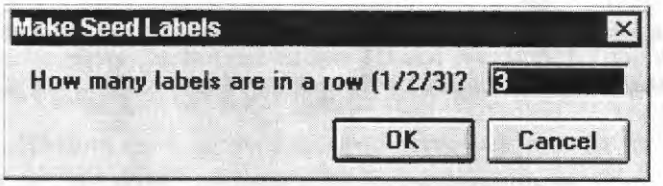

Generate Randomization Alpha-Lattice (0,1)
Number of replications in design 2
Number of treatments (e.g. genotypes) 12
Number of plots per block 4
Randomize first replication (Y,N)? Y
Number of check treatments 0
Output file name C:\FIELDBK\SEEDPREP\98A\SAMPLE
Use cursor keys to position cursor on each question
After entering all information, press <F10> to begin processing.
3:20:58pm Monday, August 24, 1998
CAPS NUM

11. Press **F10**
12. Press **ESC** three times
13. Open EXCEL and your seed preparation.

3.5 CREATING SEED LABELS FOR A SEED PREPARATION

This option lets you prepare seed labels for a seed preparation. The labels contain all information necessary to prepare the seed and sort seed envelopes according to site and experiment. Proceed as follows:-

1. From the **FIELDBOOK** menu select **SEED PREPARATION**, then **SEED LABELS**. The following dialogue box appears.



2. This question refers to the number of labels in a row you are feeding through your printer. There is fanfold paper that has only one column of label. In this case enter **1**. Enter **2** or **3** if you are feeding fanfold paper with two or three, respectively, columns of labels.
3. Select **OK.**
4. FIELDBOOK creates labels sorted according to entry.
5. Print the stock labels on fanfold paper with labels.
6. Prepare the seed and sort it by site and plot number.

4 NURSERY

4.1 CREATING A NEW NURSERY

This option lets you create a new nursery. A nursery file contains the field book for the nursery, after harvest you can create the new pedigrees and origins of the harvested seed and make stock labels for that seed.

The nursery workbook is usually created based on an existing seed preparation or from scratch. It receives a **Site ID** and **Nursery ID**. Site ID and nursery ID form together the **Origin** of the seed harvested from that nursery.

Examples for Site ID, Nursery ID and Origin:

> **Site ID**: HA97A (stands for a nursery that was grown at Harare in the year 1997, season A), MZ97B (stands for a nursery that was grown at Mzarabani in the year 1997, season B), etc.
>
> **Nursery ID**: 1201 (stands for a nursery called 1201) etc.
>
> **Origin**: HA97A-1201 is a nursery called 1201 grown at Harare in the year 1997, season A.

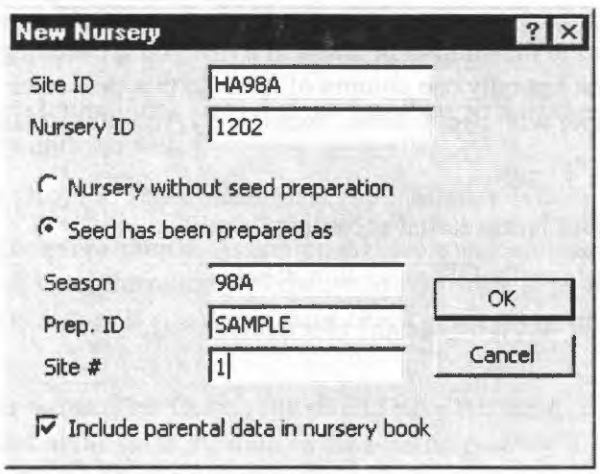
Seed harvested from a nursery will receive a unique **Stock ID** that should help you to easily localize the seed in you store room. We suggest you number the seed lots consecutively, starting with Stock ID 1, then 2, 3, … etc.

4.1.1 MAKING A NURSERY BASED ON A SEED PREPARATION

To create a new nursery based on an existing seed preparation, proceed as follows:-

1. From the **FIELDBOOK** menu select **NURSERY**, then **NEW**
2. Enter the **Site ID** (in this example HA98A) and the **Nursery ID** (1202).
3. Select **Seed has been prepared as**.
4. Enter the **Season** (in this example 98A) and **Prep ID** (SAMPLE) of the appropriate seed preparation.

5. Enter the **Site number** that has been used for planting this nursery (in this example: 1).
6. **Include parental data in nursery book** is selected by default, deselect it if you so wish.



7. Select **OK**
8. The program uses the entrylist and design of the corresponding seed preparation and site to make the entrylist of the new nursery workbook.
9. Each nursery is stored in a different nursery workbook. The first worksheet of the nursery workbook, labeled **Entrylist,** contains the list of the entries planted in that nursery. The second worksheet, labeled **Stocklist**, contains the list of the seed that is harvested from that nursery. The third worksheet, labeled **Stock Label**, contains the stock labels for seed harvested from that nursery.

	A	B	C	D	E	F	G	H	I
1	Material	SAMPLE - 1							
2									
3	Entry #	Pedigree	Origin	# Ears	Seed	E turc	P sang	MSV	GLS
4				select	quant	H may	P poli		DMR
6	1	G16BNSEQC0F228-2-4-B-B-B	MZ97B-1211-4			1.0	3.8	1.6	3.3
7	2	G16SeqC1F47-2-1-2-1-B-B-B	MZ97B-1211-5			2.0	2.5	4.0	1.8
8	3	G16SeqC1F58-1-1-1-2-B-B-B	MZ97B-1211-6			2.0	1.0	2.0	3.3
9	4	SPEC7F41-1-2-2-1-B-B-B	MZ97B-1211-10			1.0	2.8	3.7	3.2
10	5	G15C22MH131#-1-3-4-1-3-1-#-BBB-B-B-B	MZ97B-1211-11			2.0	2.5	3.0	1.0
11	6	[P49-SR(BC6S3)]HS#HS#-73-10-#1-B1-B-B-B	MZ97B-1211-14			3.0	2.8	3.0	2.0
12	7	[P49-SR(BC6S3)]HS#HS#-218-2-#1-B1-B-B-B	MZ97B-1211-17			2.0	2.8	1.2	2.0
13	8	[LB(1)8332-SR(BC3)]-183-1-1-1-B-B#1-1-B1-B-B-	MZ97B-1211-19			2.0	2.0	3.5	1.0
14	9	[PL20-SR]FS#FS#(S)-44-2#1-#1-B1-B-B-B	MZ97B-1211-20			3.0	3.0	1.5	
15									
16									
17									
18									
19									
20									

Entrylist / Stocklist / Stock Label

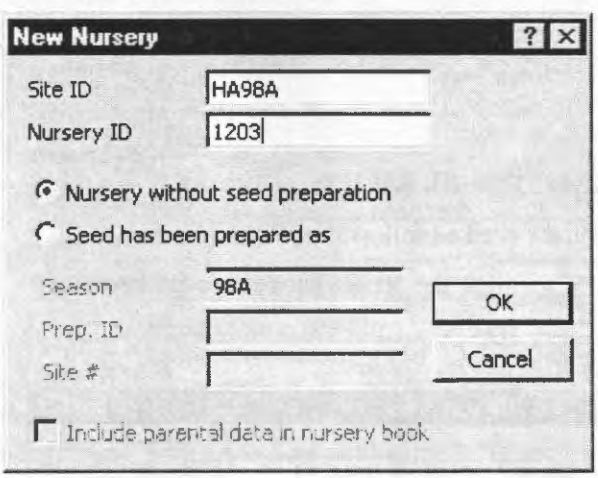
10. The nursery workbooks are characterized by **Site ID** and **Nursery ID** and are stored in C:\FBK \NURSERY\. (in this example C:\FBK \NURSERY\HA98A\1202).
11. Site ID and Nursery ID form the **Origin** of the seed harvested from the nursery (in this example HA98A-1202).
12. If **Include parental data in nursery book** was selected, the performance data of the parent that produced the seed is included in the nursery book (see arrow).

4.1.2 MAKING A NURSERY WITHOUT A CORRESPONDING SEED PREPARATION

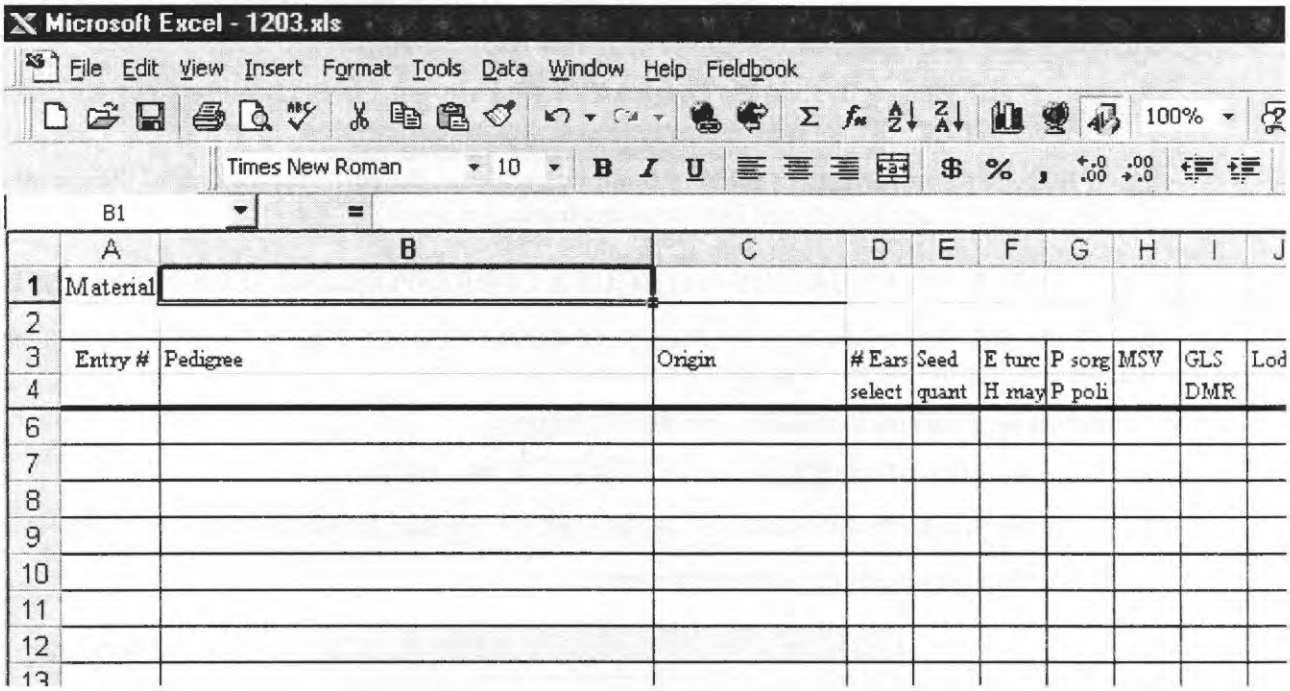
Sometimes you want to create a new nursery for which you did not prepare the seed yourself, because e.g. the seed for the nursery was sent to you ready for planting.

To make a new nursery in this case, proceed as follows:-

1. From the **FIELDBOOK** menu select **NURSERY**, then **NEW**
2. Enter the **Site ID** (in this example HA98A) and the **Nursery ID** (in this example 1203).
3. Select **Nursery without seed preparation**.



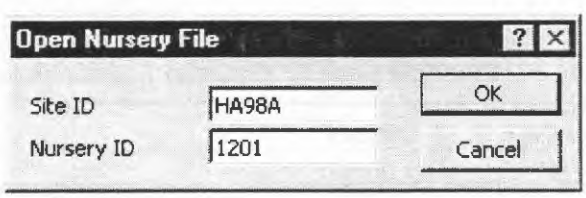
4. Select **OK**
5. You will get a blank nursery workbook into which you can manually enter pedigree and origins, or you can paste pedigree and origins from other files into this workbook.


Microsoft Excel - 1203.xls
File Edit View Insert Format Tools Data Window Help Fieldbook
Times New Roman 10
B1
Material
Entry # Pedigree Origin # Ears select Seed quant E turc H may P sorg P poli MSV GLS DMR Lod

4.2 OPENING AN EXISTING NURSERY

To open an existing nursery, proceed as follows: -

1. From the **FIELDBOOK** menu select **NURSERY**, then **OPEN**
2. Fill in **Site ID** and **Nursery ID**.



3. Select **OK**
4. The program opens the selected nursery workbook.

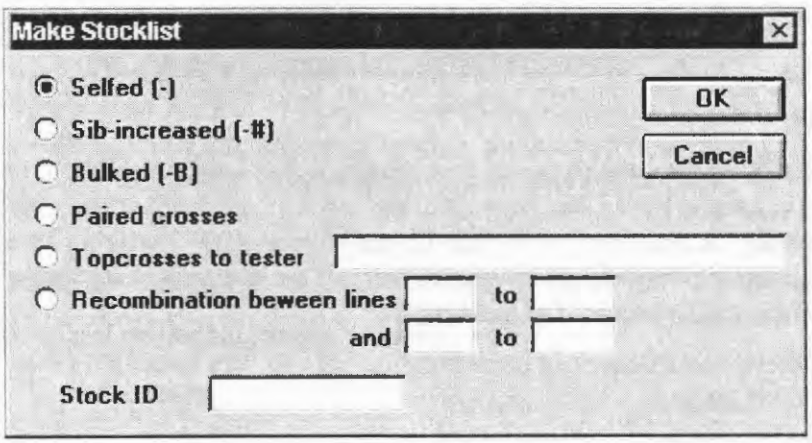
4.3 MAKE A STOCKLIST

After harvest of a nursery, you want to make the new pedigree and origins for the harvested seed, and allocate a stock ID to the seed that is unique in your entire inventory. MAKE STOCKLIST lets you update pedigrees, origins, and allocates a unique stock ID. Proceed as follows:-

1. Fill in the **number of ears selected** in column D ('# Ears select') of the Entrylist of the nursery workbook.

	A	B	C	D	E	F	G	H
1	Material	SAMPLE - 1						
2								
3	Entry #	Pedigree	Origin	# Ears	Seed	E turc	P sorg	MSV
4				select	quant	H may	P poli	
6	1	G16BNSEQC0F228-2-4-B-B-B	MZ97B-1211-4	1		1.0	3.8	1
7	2	G16SeqC1F47-2-1-2-1-B-B-B	MZ97B-1211-5	0		2.0	2.5	4
8	3	G16SeqC1F58-1-1-1-2-B-B-B	MZ97B-1211-6	3		2.0	1.0	2
9	4	SPEC7F41-1-2-2-1-B-B-B	MZ97B-1211-10	4		1.0	2.8	3
10	5	G15C22MH131#-1-3-4-1-3-1-#-BBB-B-B-B	MZ97B-1211-11	2		2.0	2.5	3
11	6	[P49-SR(BC6S3)]HS#HS#-73-10-#1-B1-B-B-B	MZ97B-1211-14	0		3.0	2.8	3
12	7	[P49-SR(BC6S3)]HS#HS#-218-2-#1-B1-B-B-B	MZ97B-1211-17	4		2.0	2.8	1
13	8	[LB(1)8332-SR(BC3)]-183-1-1-1-B-B#1-1-B1-B-B-	MZ97B-1211-19	1		2.0	2.0	3
14	9	[PL20-SR]FS#FS#(S)-44-2#1-#1-B1-B-B-B	MZ97B-1211-20	1		3.0	3.0	1
15								

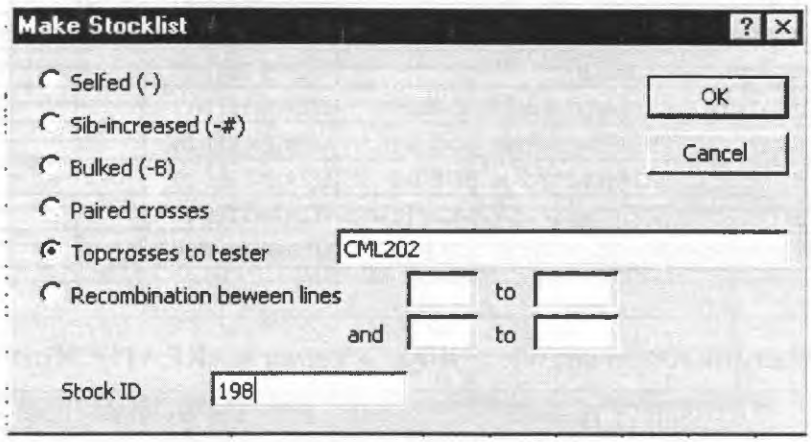
2. From the **FIELDBOOK** menu, select **NURSERY**, then **MAKE STOCKLIST**



3. Select **type of pollination**, if necessary indicate name of **tester** or **entries that are recombined**
   - **Selfed (-)** indicates plants were selfed and ears will be shelled individually to plant ear-to-row in the next season
   - **Sib-increased (-#)** indicates plants were sibbed (full-sibs or half-sibs) and ears are bulked for shelling
   - **Bulked (-B)** indicates plants were selfed and ears are bulked for shelling
   - **Paired crosses** indicates that entry 1 was crossed with entry 2, entry 3 with entry 4, 5 with 6, 7 with 8 etc.
   - **Topcrosses to tester** indicates that all entries were crossed with one common tester
   - **Recombination between lines** means a specified set of lines of this nursery was crossed with another specified set of lines in this nursery.
4. Allocate a unique **Stock ID**. You can simply use a continuous number (1, 2, 3, ...) for this purpose. **It is important that you allocate a certain Stock ID only once, so that no seed lot has the same Stock ID**. If several breeders are using the same store room, allocate a letter (A, B,

C, ...) to each breeder, and ask the breeder to put that letter in front of each of his Stock ID's (i.e., A1, A2, A3, ...)

5. In the following example all entries in this nursery were crossed with a common tester called CML202 and a Stock ID of 198 was allocated that indicates that this seed lot was number 198 harvested by this breeder.



6. Select **OK**

7. FIELDBOOK updates the pedigrees and origins and assigns a Stock ID. The Stock ID consists of two parts separated by '-'. The left part of the Stock ID is identical for all seed harvested from a certain nursery as characterized by Site ID and Nursery ID. The right part of Stock ID differs for different progenies harvested from that nursery. If the Entrylist of that nursery contains performance data, it is copied to the Stocklist.

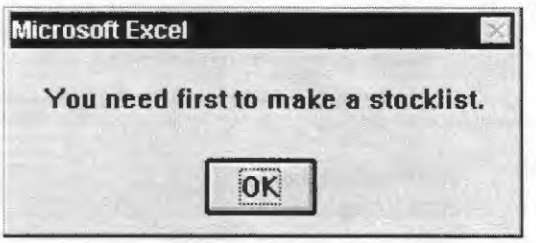
8. Enter a description for the seed harvested from this nursery in cell C3 (in this example EARLY LINES / CML202).

	A	B	C	D	E	F	G
1		Material	EARLY LINES / CML202			Stock ID	198
2							
3	#	Stock ID	Pedigree	Origin	# Ears	Seed	Memo
4					select	quant	
6	1	198-1	G16BNSEQC0F228-2-4-B-B-B/CML202	HA98A-1202-1	1		
7	2	198-2	G16SeqC1FS8-1-1-1-2-B-B-B/CML202	HA98A-1202-3	3		
8	3	198-3	SPEC7F41-1-2-2-1-B-B-B/CML202	HA98A-1202-4	4		
9	4	198-4	G15C22MH131#-1-3-4-1-3-1-#-BBB-B-B-B/CML2	HA98A-1202-5	2		
10	5	198-5	[P49-SR(BC6S3)]HS#HS#-218-2-#1-B1-B-B-B/CMI	HA98A-1202-7	4		
11	6	198-6	[LB(1)8332-SR(BC3)]-183-1-1-1-B-B#1-1-B1-B-B-	HA98A-1202-8	1		
12	7	198-7	[PL20-SR]FS#FS#(S)-44-2#1-#1-B1-B-B-B/CML20	HA98A-1202-9	1		
13							
14							
15							

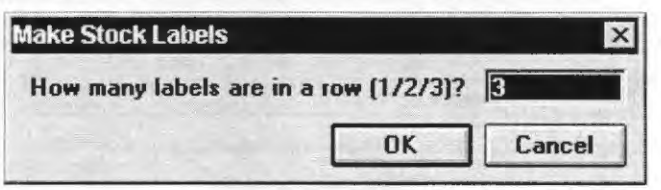
4.4 MAKING STOCK LABELS

After harvesting the ears and shelling them, you want to store the seed and label it appropriately with Stock ID, Pedigree and Origin. This option lets you prepare such Stock Labels. Proceed as follows:-

1. From the **FIELDBOOK** menu, select **NURSERY**, then **STOCK LABELS**
2. FIELDBOOK will detect if you have already made a Stocklist or not. If you have not yet made a Stocklist, the following dialog box appears.



3. In this case, go to MAKE STOCKLIST above (5.3). When you select **OK**, FIELDBOOK takes you to the **MAKE STOCKLIST** dialog box.
4. If you have made a Stocklist, the following dialog box appears



5. This question refers to the number of labels in a row you are feeding through your printer. There is fanfold paper that has only one column of label. In this case enter **1**. Enter **2** or **3** if you are feeding fanfold paper with two or three, respectively, columns of labels.
6. Select **OK**.
7. FIELDBOOK creates Stock Labels sorted according to the Stock ID.
8. Print the Stock Labels on fanfold paper with labels.

5 TRIAL

5.1 CREATING A NEW TRIAL

This option lets you create fieldbooks for all trials that you prepared with a certain seed preparation. E.g. if you prepared seed for a trial to be planted at five sites, you can create the fieldbooks for all five sites with one single command.

The trial workbooks are usually created based on an existing seed preparation, but you can develop them as well from scratch. A trial receives a **Trial ID** and is allocated to a **Season**.

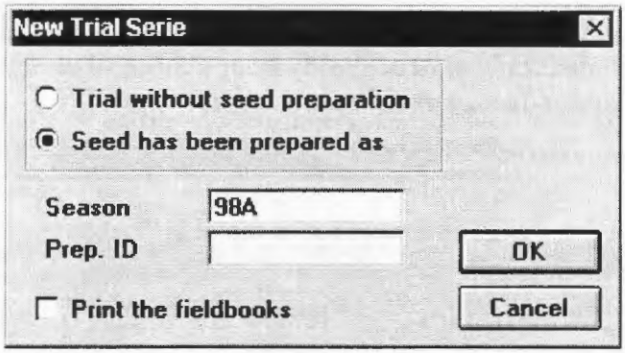
Examples for Season and Trial ID:

Season: 97A (stands for that the trial was grown in the year 1997, season A), 97B (stands for that the trial was grown in the year 1997, season B), etc.

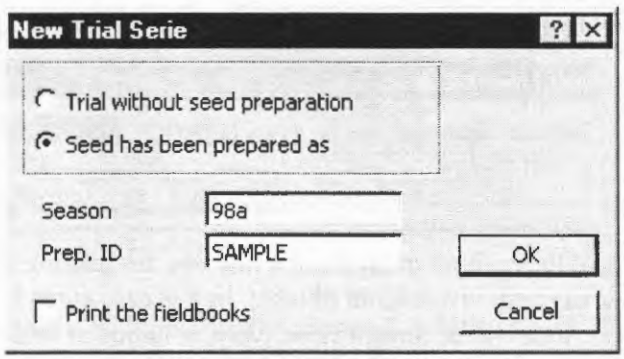
Prep ID: EPOP3 (stands for that the trial was called EPOP3), etc.

5.1.1 CREATING A NEW TRIAL WORKBOOK BASED ON A SEED PREPARATION

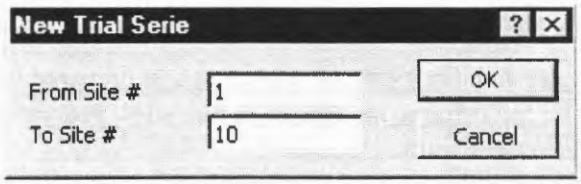
1. From the **FIELDBOOK** menu, select **TRIAL**, then **NEW**. The following dialogue box appears.



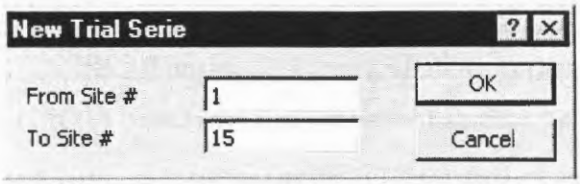
2. Fill in the correct **Season** and the correct **Prep ID** for the seed preparation that you have used to prepare the seed for these trials.



3. If you wish to print the fieldbooks at this stage tick the **Print the Fieldbooks** checkbox. You can as well print the trial fieldbooks later
4. Select **OK**.
5. FIELDBOOK will then want to know the range of sites for which you want to create trial files. Maybe you have prepared seed of a trial for 15 sites, but you only want to make the trial files for the first 10 sites. In this case, fill-in the dialog box as follows.



6. If you want to make the trial files for all 15 sites, fill in



7. FIELDBOOK will use the entry list and design in the seed preparation file to create the trial files. For each site, the program creates a new trial workbook.

8. The trial workbook is stored in C:\FILEDBOOK\TRIAL\ using season, prep ID and site number as sub-directory and file name. E.g., the trial for site # 3 of the seed preparation C:\FBK\SEEDPREP\98A\SAMPLE.XLS is stored as C:\FBK\TRIAL\98A\ SAMPLE3.XLS.

	A	B	C	D	E	F	G	H	I	J	K	L	M
1	SAMPLE3					Planting date					Harvest date		
2													
3	Rep	Bloc	Plot	Entry	Pedigree	Flowering		Height		Lodging		Num.	Num
4						male	female	plant	ear	root	shoot	plants	ears
6	1	1	1	9	[PL20-SR]FS#FS#(S)-44-2#1-#1-B1-B-B-B								
7	1	1	2	2	G16SeqC1F47-2-1-2-1-B-B-B								
8	1	1	3	7	[P49-SR(BC6S3)]HS#HS#-218-2-#1-B1-B-B-B								
9	1	1	4	8	[LB(1)8332-SR(BC3)]-183-1-1-1-B-B#1-1-B1-B-B-B								
10	1	2	5	3	G16SeqC1FS8-1-1-1-2-B-B-B								
11	1	2	6	11	CHECK 2								
12	1	2	7	1	G16BNSEQC0F228-2-4-B-B-B								
13	1	2	8	5	G15C22MH131#-1-3-4-1-3-1-#-BBB-B-B-B								
14	1	3	9	10	CHECK 1								
15	1	3	10	12	CHECK 3								
16	1	3	11	4	SPEC7F41-1-2-2-1-B-B-B								

9. The trial workbook contains a **Fieldbook** with design and pedigrees, a **Result** sheet with entry numbers, pedigrees and origins, and a master sheet with the design only (labeled as **HP**).

17	1	3	12	6	[P49-SR(BC6S3)]HS#HS#-73-10-#1-B1-B-B-B
18	2	1	13	9	[PL20-SR]FS#FS#(S)-44-2#1-#1-B1-B-B-B
19	2	1	14	2	G16SeqC1F47-2-1-2-1-B-B-B
20	2	1	15	7	[P49-SR(BC6S3)]HS#HS#-218-2-#1-B1-B-B-B

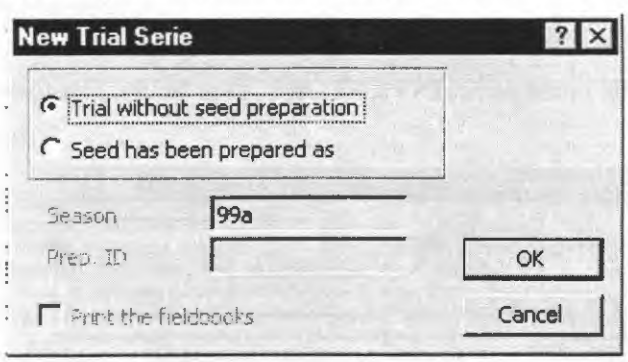
Fieldbook / Results / HP /

10. A copy of the HP sheet is stored as a Lotus-123 file in C:\FILEDBOOK\TRIAL\ using season, prep ID and site number as sub-directory and workbook name (example C:\FBK\TRIAL \98A\SAMPLE3.WK1). This file contains the trial design and can be transferred to an HP palmtop

5.1.2 CREATING A NEW TRIAL WORKBOOK WITHOUT A SEED PREPARATION

Sometimes you want to create a new trial for which you did not prepare the seed yourself, because e.g. the seed for the trial was sent to you ready for planting. Proceed as follows:-

1. From the **FIELDBOOK** menu, select **TRIAL**, then **NEW**. The following dialogue box appears.



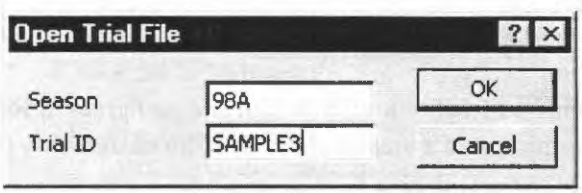
2. Click on **Trial without seed preparation**
3. You will be prompted to fill in **Season** (e.g. 98A) and **Trial ID** (e.g. NOPREP).

4. Select **OK**.

5.2 OPEN AN EXISTING TRIAL

To open an existing trial workbook, proceed as follows:-

1. From the **FIELDBOOK** menu select **TRIAL**, then **OPEN**. The following dialog box appears.



2. Fill in the **Season** (e.g. 98A) and **Trial ID** (e.g. SAMPLE3).
3. Select **OK.**
4. The program opens the selected trial workbook.

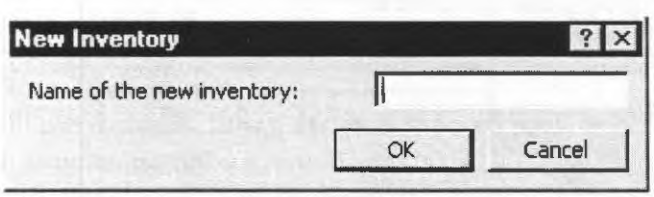
6 INVENTORY

So far you have stored the information on harvested seed in individual nursery files. Often you want to search across different nursery files, and it is therefore of advantage to pull all nursery information into one single file – the inventory. **An inventory file is usually created only ONCE because you want to have all information in ONE file only.** After creating an inventory, you just continue adding information coming from nurseries that you harvested.

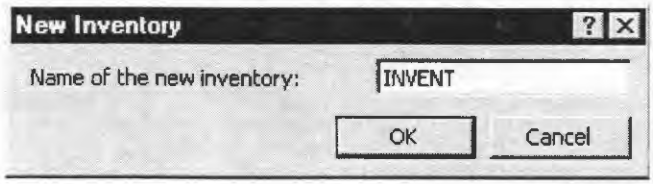
6.1 CREATING A NEW INVENTORY

To create your inventory file, proceed as follows: -

1. From the **FIELDBOOK** menu select **INVENTORY**, then **NEW**. The following dialog box appears.



2. Fill in the **name of your inventory**, in this example INVENT.



3. Select **OK.**

6.2 OPEN THE INVENTORY

To open you inventory workbook, proceed as follows: -

1. From the **FIELDBOOK** menu, select **INVENTORY**, then **OPEN.**
2. As you only have one single inventory, FIELDBOOK opens it for you to select material.

Microsoft Excel - InvMB.xls

File Edit View Insert Format Tools Data Window Help Fieldbook

Times New Roman 8

A1 = SEED INVENTORY M. Bänziger, 1998

	A	B	C	D	E	F	G
1	SEED INVENTORY M. Bänziger, 1998						CIMMYT-Z
2							
3	STOCK #		PEDIGREE	ORIGIN			MEMO
4							
5							
6	A127	1	G16BNSEQC0F118-1-1-B/G16SeqC1F47-2-1-2-1-B-B	HA98A	1100	2/3	98 SADVEA F1
7	A127	2	G16BNSEQC0F118-1-1-B/[[NAW 5867/P30-SR]-111-2/[NAW 5867/P30-SR]-52-1]-5-3-1-B	HA98A	1100	2/4	98 SADVEA F1
8	A127	3	G16BNSEQC0F118-1-1-B/[[NAW 5867/P30-SR]-111-2/[NAW 5867/P30-SR]-25-1]-3-1-1-B-B	HA98A	1100	2/5	98 SADVEA F1
9	A127	4	G16BNSEQC0F118-1-1-B/[COMPE2/P43-SR//COMPE2] FS#-20-1-1-B-1-B	HA98A	1100	2/6	98 SADVEA F1
10	A127	5	G16SeqC1F47-2-1-2-1-B-B/[[NAW 5867/P30-SR]-111-2/[NAW 5867/P30-SR]-52-1]-5-3-1-B	HA98A	1100	3/4	98 SADVEA F1
11	A127	6	G16SeqC1F47-2-1-2-1-B-B/[[NAW 5867/P30-SR]-111-2/[NAW 5867/P30-SR]-25-1]-3-1-1-B-B	HA98A	1100	3/5	98 SADVEA F1
12	A127	7	G16SeqC1F47-2-1-2-1-B-B/[COMPE2/P43-SR//COMPE2] FS#-20-1-1-B-1-B	HA98A	1100	3/6	98 SADVEA F1
13	A127	8	[[NAW 5867/P30-SR]-111-2/[NAW 5867/P30-SR]-52-1]-5-3-1-B/[[NAW 5867/P30-SR]-111-2/[NA	HA98A	1100	4/5	98 SADVEA F1
14	A127	9	[[NAW 5867/P30-SR]-111-2/[NAW 5867/P30-SR]-52-1]-5-3-1-B/[COMPE2/P43-SR//COMPE2]	HA98A	1100	4/6	98 SADVEA F1
15	A127	10	[[NAW 5867/P30-SR]-111-2/[NAW 5867/P30-SR]-25-1]-3-1-1-B-B/[COMPE2/P43-SR//COMPE2	HA98A	1100	5/6	98 SADVEA F1
16	A127	11	G16BNSEQC0F118-1-1-B/[[K64R/PL16-SR]-39-1/[K64R/PL16-SR]-20-2]-5-1-2-B-B-B	HA98A	1100	2/101-42	98 SADVEA F1
17	A127	12	G16SeqC1F47-2-1-2-1-B-B/[[K64R/PL16-SR]-39-1/[K64R/PL16-SR]-20-2]-5-1-2-B-B-B	HA98A	1100	3/101-42	98 SADVEA F1
18	A128	1	K64R/DTP1WC6F181-1-#-3-1-1-B-B	HA98A	1101	1/2	98 SADVEB F1
19	A128	2	K64R/G16SeqC1F44-1-1-1-1-B-B	HA98A	1101	1/3	98 SADVEB F1

3. If you move towards the right in your inventory, you will find **performance data** (arrow) for the seed listed in the inventory.

	A	B	C	I	J	K	L	M	N
1	SEED INVENTORY M. Bänziger, 1998								
2									
3	STOCK #		PEDIGREE	E turc H may	P sorg P poli	MSV	GLS DMR	Lodg	Ear asp
4									
5									
6	A127	1	G16BNSEQC0F118-1-1-B/G16SeqC1F47-2-1-2-1-B-B		3.3		2.3		
7	A127	2	G16BNSEQC0F118-1-1-B/[[NAW 5867/P30-SR]-111-2/[NAW 5867/P30-SR]-52-1]-5-3-1-B		3.3		2.3		
8	A127	3	G16BNSEQC0F118-1-1-B/[[NAW 5867/P30-SR]-111-2/[NAW 5867/P30-SR]-25-1]-3-1-1-B-B		3.2		2.3		
9	A127	4	G16BNSEQC0F118-1-1-B/[COMPE2/P43-SR//COMPE2] FS#-20-1-1-B-1-B		3.3		2.6		
10	A127	5	G16SeqC1F47-2-1-2-1-B-B/[[NAW 5867/P30-SR]-111-2/[NAW 5867/P30-SR]-52-1]-5-3-1-B		3.3		2.4		
11	A127	6	G16SeqC1F47-2-1-2-1-B-B/[[NAW 5867/P30-SR]-111-2/[NAW 5867/P30-SR]-25-1]-3-1-1-B-B		3.2		2.4		
12	A127	7	G16SeqC1F47-2-1-2-1-B-B/[COMPE2/P43-SR//COMPE2] FS#-20-1-1-B-1-B		3.3		2.1		
13	A127	8	[[NAW 5867/P30-SR]-111-2/[NAW 5867/P30-SR]-52-1]-5-3-1-B/[[NAW 5867/P30-SR]-111-2/[NA		3.2		3.1		
14	A127	9	[[NAW 5867/P30-SR]-111-2/[NAW 5867/P30-SR]-52-1]-5-3-1-B/[COMPE2/P43-SR//COMPE2]		3.3		2.8		

4. Below the title for the performance data, there are small **arrows**. If you click on such an arrow (e.g. the arrow below P. sorg), you get the following **drop down menu**.

STOCK #		PEDIGREE	E turc H may	P sorg P poli	MS
A127	1	G16BNSEQC0F118-1-1-B/G16SeqC1F47-2-1-2-1-B-B			
A127	2	G16BNSEQC0F118-1-1-B/[[NAW 5867/P30-SR]-111-2/[NAW 5867/P30-SR]-52-1]-5-3-1-B			
A127	3	G16BNSEQC0F118-1-1-B/[[NAW 5867/P30-SR]-111-2/[NAW 5867/P30-SR]-25-1]-3-1-1-B-B			
A127	4	G16BNSEQC0F118-1-1-B/[COMPE2/P43-SR//COMPE2] FS#-20-1-1-B-1-B			
A127	5	G16SeqC1F47-2-1-2-1-B-B/[[NAW 5867/P30-SR]-111-2/[NAW 5867/P30-SR]-52-1]-5-3-1-B			
A127	6	G16SeqC1F47-2-1-2-1-B-B/[[NAW 5867/P30-SR]-111-2/[NAW 5867/P30-SR]-25-1]-3-1-1-B-B			
A127	7	G16SeqC1F47-2-1-2-1-B-B/[COMPE2/P43-SR//COMPE2] FS#-20-1-1-B-1-B			
A127	8	[[NAW 5867/P30-SR]-111-2/[NAW 5867/P30-SR]-52-1]-5-3-1-B/[[NAW 5867/P30-SR]-111-2/[			
A127	9	[[NAW 5867/P30-SR]-111-2/[NAW 5867/P30-SR]-52-1]-5-3-1-B/[COMPE2/P43-SR//COMPE			
A127	10	[[NAW 5867/P30-SR]-111-2/[NAW 5867/P30-SR]-25-1]-3-1-1-B-B/[COMPE2/P43-SR//COMP			
A127	11	G16BNSEQC0F118-1-1-B/[[K64R/PL16-SR]-33-1/[K64R/PL16-SR]-20-2]-5-1-2-B-B-B			
A127	12	G16SeqC1F47-2-1-2-1-B-B/[[K64R/PL16-SR]-33-1/[K64R/PL16-SR]-20-2]-5-1-2-B-B-B			
A128	1	K64R/DTP1WC6F181-1-#-3-1-1-B-B			
A128	2	K64R/G16SeqC1F44-1-1-1-1-B-B			
A128	4	K64R/SC/K64R ZSMA]-6-2-X-2-B-B			
A128	5	K64R/CML 205: [EMSR]#B#BF101SR-2-1SR-3-2-4-B-B-B			
A128	6	K64R/CML 221: [AC8730-SR]-13-1-1-1-#-B-B			
A128	7	K64R/SC/K64R ZSMA)-6-2-X-1-2-B-B			
A128	8	K64R/[[K64R/P30-SR]-82-2/[K64R/P30-SR]-87-4]-7-3-4-B-B-B			

(All)
(Top 10...)
(Custom...)
1.0
1.3
1.4
1.5
1.6
1.7
1.8
1.9
2.0
2.1
2.2
2.3
2.4
2.5
2.6
2.7
2.8

5. If you click e.g. on 2.0, EXCEL will select all inventory items that have a score of 2.0 for P. sorghi.

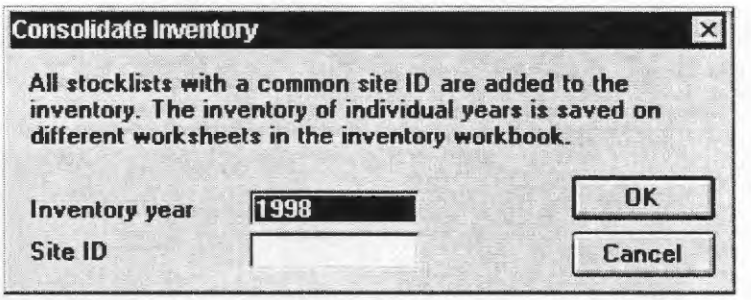
	A	B	C	I	J	K	L
1	SEED INVENTORY M. Bäziger, 1998						
2							
3	STOCK #		PEDIGREE	E turc H may	P sorg P poli	MSV	GLS DMR
4							
5							
386	A131	53	SC/ZM605#b-19-2-X]-1-2-X-1-1-B-B-B		2.0		2.1
464	A134	1	G15C22MH148#-1-1-1-6-1-4-#-BBB-B-B-B	2.0	2.0	2.0	2.0
466	A134	13	[LB(1)8332-SR(BC3)]-183-1-1-1-B-B#1-1-B1-B-B-B	2.0	2.0	3.5	1.0
473	A135	6	DTP1WC7F120-1-6-1-2-B	2.0	2.0	2.0	2.5
475	A135	8	DTP1WC7F122-4-2-2-1-B	3.5	2.0	3.0	2.0
482	A135	15	DTP2WC5F138-1-2-3-2-B	2.0	2.0	4.0	3.0
492	A135	25	DTP1WC7F230-1-6-B-B	3.0	2.0	3.8	2.0
498	A135	31	DTP1WC6F259-2-#-4-2-1-1-B-B-B		2.0		
500	A135	33	DTP1WC6F186-1-#-1-4-1-B-B		2.0	3.0	
538	A139	8	BS19S2no68-1-2-B-B-B	1.5	2.0	5.0	3.2
620	A140	17	G16BNSEQC1F115-4-1		2.0		2.5
686	A143	17	(90323/LPSC3H297-2-1-1-2-2-#)-B-1/CML202		2.0	2.7	2.0
716	A143	47	([100MSR/[MSR:123]-1-1-1-#]-1-3-#-2-B//LPSC3H297-2-1-1-1-3-#)-B-5/CML202		2.0	3.5	3.5
753	A143	84	(CML206/LPSC3H297-2-1-1-2-2-#)-B-4/CML202		2.0	3.2	3.5
780	A144	1	G15C22MH148#-1-1-1-6-1-4-#-BBB-B-B/CML202	2.0	2.0	2.0	2.0
790	A144	11	[LB(1)8332-SR(BC3)]-183-1-1-1-B-B#1-1-B1-B-B/CML202	2.0	2.0	1.2	1.0
808	A150	17	(90323/LPSC3H297-2-1-1-2-2-#)-B-1/CML206		2.0	2.7	2.0

6.3 CONSOLIDATE THE INVENTORY

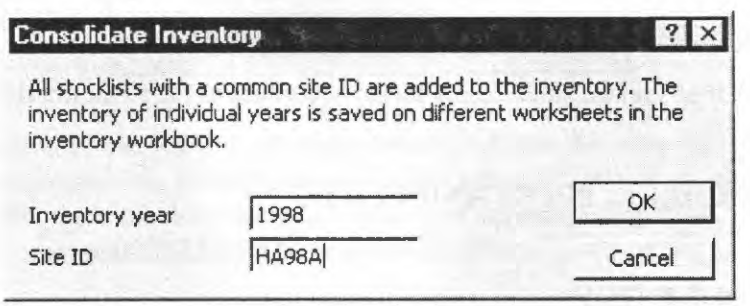
This option lets you add the stocklists from all nurseries with the same Site ID to the inventory. I.e., after finishing harvesting your nurseries at a certain site and making all the stocklists, you can move the stocklists with one single command to the inventory. This is called consolidate inventory.

To consolidate your inventory, proceed as follows: -

1. From the **FIELDBOOK** menu select **INVENTORY**, then **CONSOLIDATE**. The following dialog box appears.


Consolidate Inventory
All stocklists with a common site ID are added to the inventory. The inventory of individual years is saved on different worksheets in the inventory workbook.
Inventory year
1998
Site ID
OK
Cancel

2. Because an EXCEL worksheet cannot contain more than 65536 rows, you need to divide your inventory so that not more than 65550 seed lots are stored on the same worksheet. You can divide your inventory using **Inventory year**. I.e., different inventory years are stored on different worksheets.
3. It is advisable to store as much information as possible on a certain worksheet. Thus, before consolidating, you need to first consider how many different seed lots you harvest at a certain site, season, year. In an average breeding program, you may produce 65550 seed lots only within three to five years. In this case, use 1998-2002 as "inventory year" and store all nurseries harvested between 1998 and 2002 in the "1998-2002 inventory year". In a larger breeding program, you may produce 65550 seed lots within one to two years. In this case, use 1998 as "inventory year" and store all nurseries harvested in 1998 in the "1998 inventory year".
4. Fill in **Inventory year** and the **Site ID** from where you want to add the information of the stocklists to the inventory.


Consolidate Inventory
All stocklists with a common site ID are added to the inventory. The inventory of individual years is saved on different worksheets in the inventory workbook.
Inventory year
1998
Site ID
HA98A
OK
Cancel

5. Select **OK.**

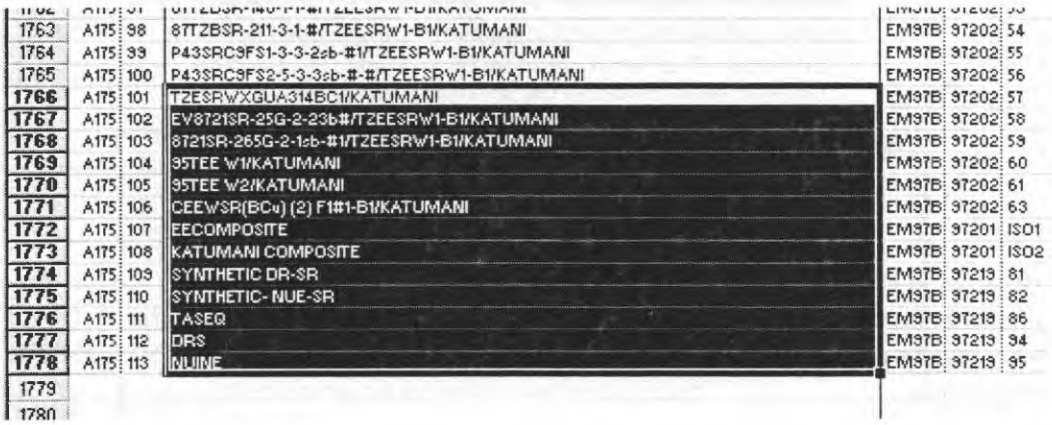
6.4 CREATE STOCK LABELS FROM THE INVENTORY

Usually Stock Labels are created after making a stocklist in a certain nursery file. However, sometimes you enter pedigrees, origins and Stock ID's manually in your inventory and you want to label the corresponding germplasm.

Proceed as follows: -

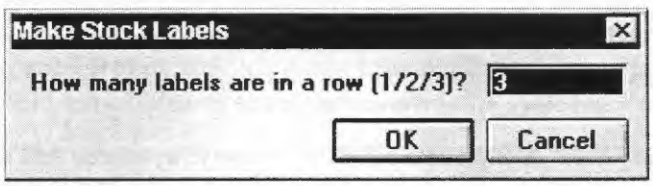
1. Open the inventory and manually enter the information for such germplasm (Stock Id, pedigree, origin, performance data etc.)

2. Highlight the pedigrees for which you want to make stock labels.



1763	A175	98	8TTZBSR-211-3-1-#/TZEESRW1-B1/KATUMANI	EM97B	97202	54
1764	A175	99	P43SRC9FS1-3-3-2sb-#1/TZEESRW1-B1/KATUMANI	EM97B	97202	55
1765	A175	100	P43SRC9FS2-5-3-3sb-#-#/TZEESRW1-B1/KATUMANI	EM97B	97202	56
1766	A175	101	TZESRWXGUA314BC1/KATUMANI	EM97B	97202	57
1767	A175	102	EV8721SR-25G-2-23b#/TZEESRW1-B1/KATUMANI	EM97B	97202	58
1768	A175	103	8721SR-265G-2-1sb-#1/TZEESRW1-B1/KATUMANI	EM97B	97202	59
1769	A175	104	95TEE W1/KATUMANI	EM97B	97202	60
1770	A175	105	95TEE W2/KATUMANI	EM97B	97202	61
1771	A175	106	CEEWSR(BCu) (2) F1#1-B1/KATUMANI	EM97B	97202	63
1772	A175	107	EECOMPOSITE	EM97B	97201	ISO1
1773	A175	108	KATUMANI COMPOSITE	EM97B	97201	ISO2
1774	A175	109	SYNTHETIC DR-SR	EM97B	97213	81
1775	A175	110	SYNTHETIC- NUE-SR	EM97B	97213	82
1776	A175	111	TASEQ	EM97B	97213	86
1777	A175	112	DRS	EM97B	97213	94
1778	A175	113	NUINE	EM97B	97213	95
1779						
1780						

3. From the **FIELDBOOK** menu select **INVENTORY**, then **STOCK LABELS**. The following dialog box appears.



4. Enter the **Number of labels per row** depending on what kind of paper you are using.
5. Select **OK**.
6. Field book then creates stock labels sorted according to the stock number.

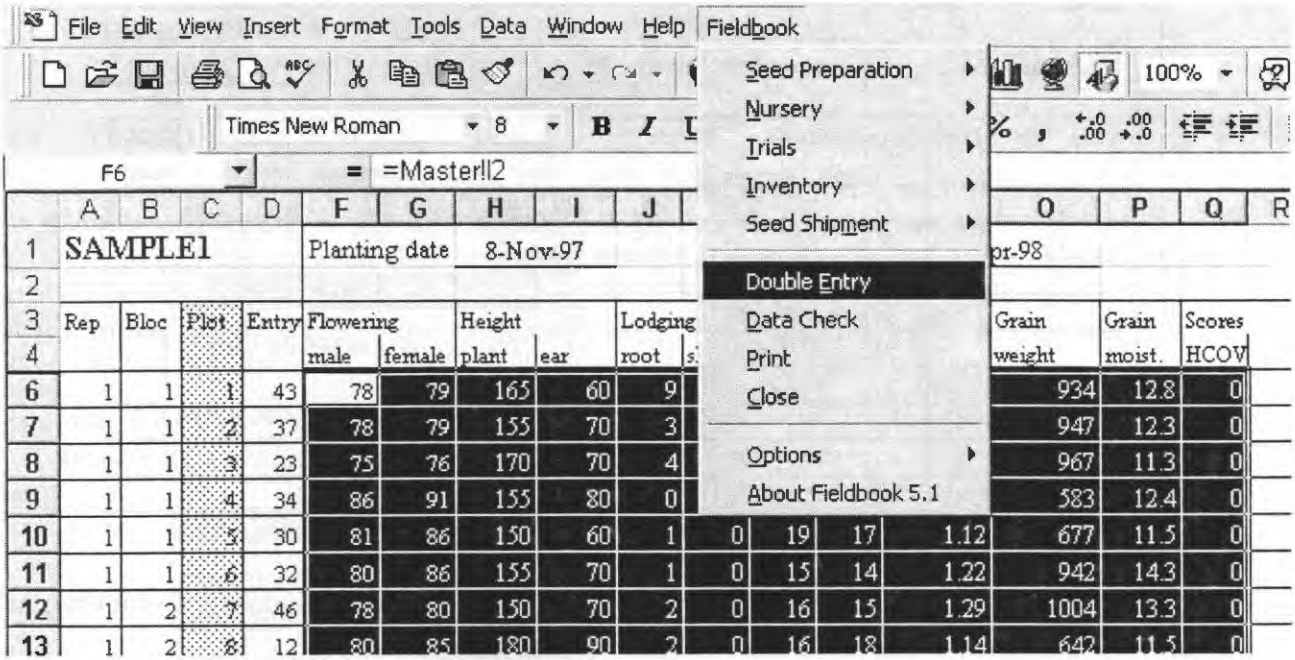
7 DATA CHECK, PRINT AND CLOSE

7.1 DOUBLE ENTRY

Data entered into the computer need checking. Some people prefer to enter data *twice* instead of visually comparing data on a hardcopy with data entered in the computer. FIELDBOOK provides a feature to verify data by entering them twice.

Proceed as follows:-

1. Enter the data once.
2. Highlight the data that you want to check.
3. From the **FIELDBOOK** menu select **DOUBLE ENTRY**.



4. The following dialog box appears.

5. Enter the data a second time. As long you enter the second time the same data you entered the first time (in this example 78) , the program proceeds to the next data. If the data entered the second time is different to the data entered the first time, an error is reported. You have to enter the faulty data twice so that FIELDBOOK accepts that data.

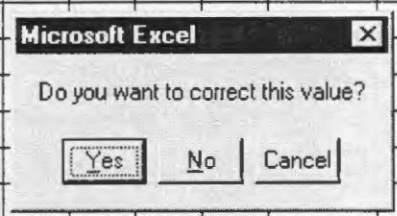
7.2 DATA CHECK

FIELDBOOK provides an additional feature to check data. It can find all data that deviates by more than three standard deviations from the mean of a certain column (i.e. extreme data) and gives you the choice to correct such data.

Proceed as follows: -

1. Highlight the data that you want to check.
2. From the **FIELDBOOK** menu select **DATA CHECK.**
3. FIELDBOOK starts checking column by column. If it finds data that deviates by more than three standard deviations from the mean of that column, the following message appears. Note that the value that was found to differ by more than three standard deviations from the mean of that column is highlighted by the cursor (arrow).

	A	B	C	D	F	G	H	I	J	K	L	M	N	O
1	SAMPLE1				Planting date		8-Nov-97				Harvest date		21-Apr-98	
2														
3	Rep	Bloc	Plot	Entry	Flowering		Height		Lodging		Num.	Num.	Field	Grain
4					male	female	plant	ear	root	shoot	plants	ears	weight	weight
6	1	1	1	43	78	79	165	60	9	0	15	13	1.54	9
7	1	1	2	37	78	79	155	70	3	0	15	14	1.27	9
8	1	1	3	23	75	76	170	70						9
9	1	1	4	34	86	91	155	80						5
10	1	1	5	30	81	86	150	60						6
11	1	1	6	32	80	86	155	70						9
12	1	2	7	46	78	80	150	70						10
13	1	2	8	12	80	85	180	90						6
14	1	2	9	48	80	84	170	70	0	0	16	14	1.52	8
15	1	2	10	41	80	81	160	70	0	0	14	15	1.64	11



4. If you want to correct the value (because it does not agree with the hardcopy of your data), select **YES**, and the following dialog box appears.

Enter the correct value and press **OK**. The program will search for the next value that deviates by more than three standard deviations from the mean.

5. If you do not want to correct that value (because it does agree with the hardcopy of your data), select **NO.** The program will search for the next value that deviates by more than three standard deviations from the mean.

7.3 PRINT

FIELDBOOK automatically formats your worksheets and prints them by selecting **PRINT** from the **FIELDBOOK** menu.

7.4 CLOSE

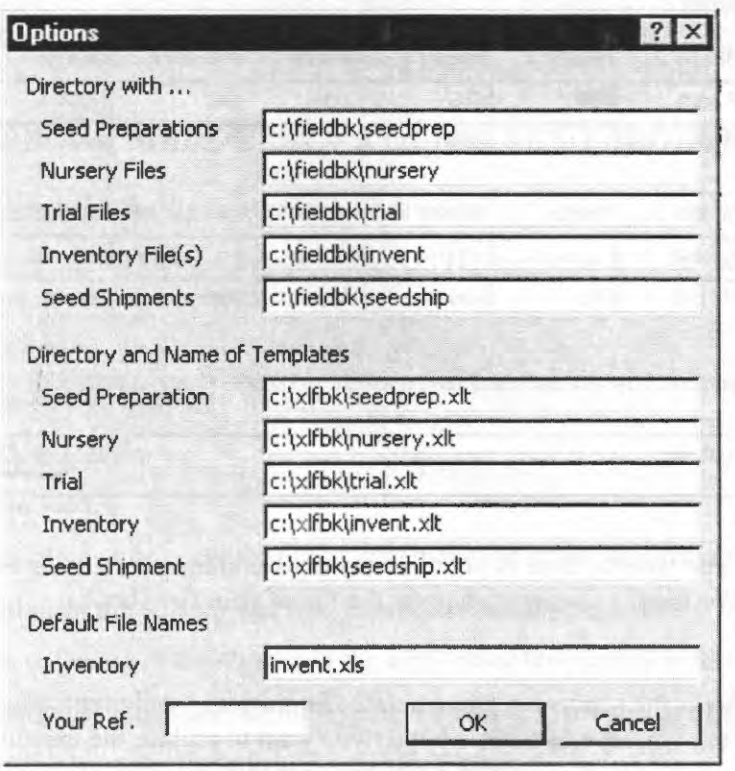
FIELDBOOK automatically goes to the top of each worksheet, and saves and closes a file by selecting **CLOSE** from the **FIELDBOOK** menu.

8 OPTIONS

8.1 DEFAULTS

The default installation of FIELDBOOK creates a sub-directory in your C: drive called C:\FBK. Within this subdirectory, further subdirectories are made for seed preparation files (C:\FBK\SEEDPREP), nursery files (C:\FBK\NURSERY), trial files (C:\FBK\TRIAL), inventory file (C:\FBK\INVENT) and seed shipment files (C:\FBK\SEEDSHIP). As a more advanced user, you may want to place these files to another directory and still want FIELDBOOK to find the correct files. Proceed as follows: -

1. From the **FIELDBOOK** menu select **OPTIONS**, then **DEFAULTS**. The following dialog box appears.

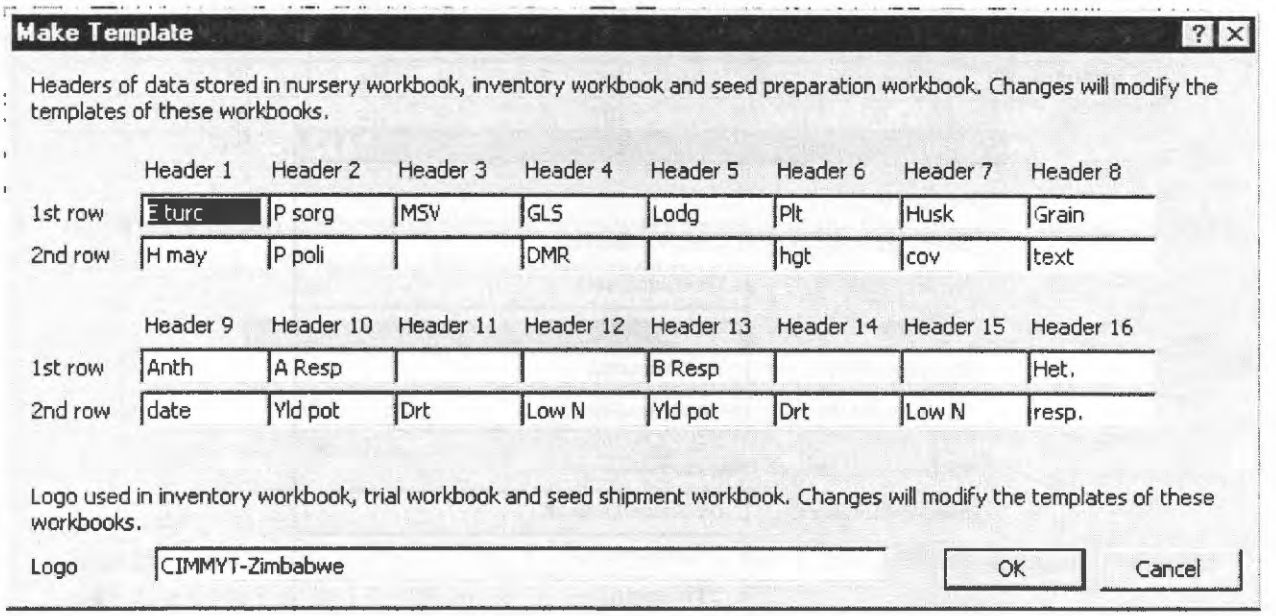


2. You can change the location of e.g. your seed preparation files by exchanging C:\FBK\SEEDPREP with any other subdirectory.
3. The default installation of FIELDBOOK creates a sub-directory in your C: drive called C:\XLFBK. Within this subdirectory, all your templates for seed preparation files (C:\XLFBK\SEEDPREP.XLT), nursery files (C:\XLFBK\NURSERY.XLT), trial files (C:\XLFBK\TRIAL.XLT), inventory file (C:\XLFBK\INVENT.XLT) and seed shipment files (C:\XLFBK\SEEDSHIP.XLT) are saved. You can change the location of e.g. your nursery template by exchanging C:\XLFBK\NURSERY.XLT with any other name of a template.

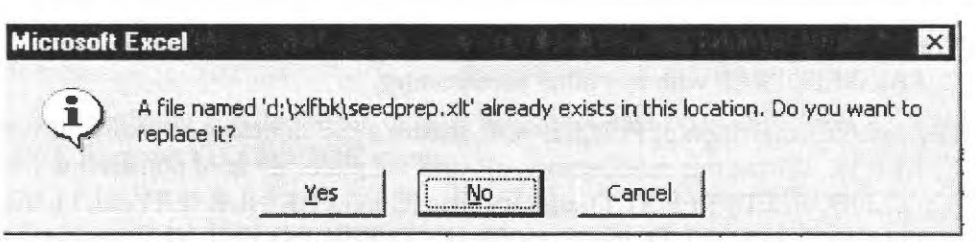
8.2 CHANGE TEMPLATES

Your nursery, seed preparation, and inventory files contain common headers for performance data that you routinely gather in your breeding program. You may want to change the headers to match the specific requirement of your breeding program. Proceed as follows:

1. Make a list of traits (performance data) you routinely gather in your nursery and for which you want to be able to search the inventory.
2. From the **FIELDBOOK** menu select **OPTIONS**, then **CHAMGE TEMPLATES**. The following dialog box appears.


Make Template
Headers of data stored in nursery workbook, inventory workbook and seed preparation workbook. Changes will modify the templates of these workbooks.
Header 1 Header 2 Header 3 Header 4 Header 5 Header 6 Header 7 Header 8
1st row E turc P sorg MSV GLS Lodg Plt Husk Grain
2nd row H may P poli DMR hgt cov text
Header 9 Header 10 Header 11 Header 12 Header 13 Header 14 Header 15 Header 16
1st row Anth A Resp B Resp Het.
2nd row date Yld pot Drt Low N Yld pot Drt Low N resp.
Logo used in inventory workbook, trial workbook and seed shipment workbook. Changes will modify the templates of these workbooks.
Logo CIMMYT-Zimbabwe
OK
Cancel

3. Fill in the headers you want to have in your nursery book and inventory using **Header 1** to **Header 16**, enter the **Logo** you want to have at the top of your field books.
4. Press **OK**.
5. FIELDBOOK replaces the headers in the templates for nursery, seed preparation, inventory, and trial files and will ask you several times whether you want to replace the existing template



6. Choose **YES**.
7. **Note:** Changes of templates will only become effective for workbooks created ***after*** using 'Change Templates'. **Note:** If headers are changed using 'Change Templates', data from workbooks created ***before*** using 'Change Templates' ***might be allocated wrongly*** to workbooks

created after using 'Change Templates', because FIELDBOOK allocates data according to their position on the worksheet.

8. **Therefore: Select the headers you want to use in your nursery book when you start working with FIELDBOOK. Afterwards do not change them any more.**

8.3 MODIFYING THE FORMAT OF TEMPLATES

The default installation of FIELDBOOK creates a sub-directory in your C: drive called C:\XLFBK. Within this subdirectory, all your templates for seed preparation files (C:\XLFBK\SEEDPREP.XLT), nursery files (C:\XLFBK\NURSERY.XLT), trial files (C:\XLFBK\TRIAL.XLT), inventory file (C:\XLFBK\INVENT.XLT) and seed shipment files (C:\XLFBK\SEEDSHIP.XLT) are saved. These templates can be opened like other EXCEL workbooks and the format of the various worksheets can be modified, e.g. to fit the printer set-up. However, the name of the worksheets and the position of rows and columns as indicated in Annex 2 must not be changed. Save modified templates as EXCEL template files. For further information, see Annex 2.

9 FIELDBOOK MADE EASY – A QUICK RUN THROUGH THE SEASON

1. Make the entrylist for the seed preparation.
2. Create an alpha (0,1) lattice design using ALPHA and store it in the same directory and with the same name as the seed preparation.
3. Apply the design.
4. Modify the design manually if necessary.
5. Make the seed labels.
6. Prepare the seed.
7. Make corrections that occur during seed preparation in the seed preparation workbook.
8. Create and print the nursery and trial fieldbooks based on the seed preparation workbooks.
9. Enter data collected in the nursery in the entrylist of the nursery workbook.
10. Harvest nurseries, double-enter the number of ears selected and seed quantity.
11. Update pedigrees and print stocklist and stock labels.
12. Make corrections that occur during shelling in the stocklist of the nursery workbook.
13. When all nurseries of a site are harvested and stocklists are corrected, update the inventory.
14. Double-enter data collected in trials in the fieldbook of the trial workbook.
15. Use data check to highlight extreme values.
16. Calculate the variables that should be analyzed using the HP sheet.
17. Save the master sheet as comma-delimited file (*.CSV).
18. Import the comma-delimited file to MSTAT using import.
19. Make the analysis of variance. Note, ALPHA cannot handle missing data.
20. Open the ASCII file that contains analysis of variance and adjusted means (*.AOV file).

21. Copy adjusted means and statistics to the result sheet of your trial workbook.

10 ANNEX TO FIELDBOOK

10.1 ANNEX 1: COMPONENT OF FIELDBOOK

- INVENT.XLT - Template for the seed inventory
- NURSERY.XLT - Template for the nursery file
- PERSONAL.XLS - Personal Macro Workbook that contains Dialog Sheets and Macros
- SEEDPREP.XLT - Template for the seed preparation file
- SEEDSHIP.XLT - Template for the seed shipment file
- TRIAL.XLT - Template for the trial file
- FBK51.XLA (FIELDBOOK 5.1 only) - Compiled ADD-IN program for EXCEL

10.2 ANNEX 2: TEMPLATE RESTRICTIONS

10.2.1 INVENT.XLT – INVENTORY TEMPLATE

- Worksheets are labeled 'Inventory' and 'Stock Label'
- Worksheet 'Inventory': Cell A1 is allocated to Title
- Worksheet 'Inventory': Cell G1 is allocated to Logo
- Worksheet 'Inventory': Column A and B are allocated to Stock ID
- Worksheet 'Inventory': Column C is allocated to Pedigree
- Worksheet 'Inventory': Column D, E and F are allocated to Origin
- Worksheet 'Inventory': Column G is allocated to Memo
- Worksheet 'Inventory': Column H is allocated to Seed quantity
- Worksheet 'Inventory': Column I to X are allocated to Headers 1 to 16 as defined in Options · Change Templates.
- Worksheet 'Inventory': Inventory items are listed starting row # 6.
- Worksheet 'Inventory': Row # 5 is empty.

10.2.2 NURSERY.XLT – NURSERY TEMPLATE

- Worksheets are labeled 'Entrylist', 'Stocklist' and 'Stock Label'
- Worksheet 'Entrylist': Cell B1 is allocated to Title
- Worksheet 'Entrylist': Cell R1 is allocated to Site and Nursery ID
- Worksheet 'Entrylist': Column A is allocated to Entry #
- Worksheet 'Entrylist': Column B is allocated to Pedigree
- Worksheet 'Entrylist': Column C is allocated to Origin

- Worksheet 'Entrylist': Column D is allocated to # Ear selected
- Worksheet 'Entrylist': Column E is allocated to Seed quantity
- Worksheet 'Entrylist': Column F to U are allocated to Headers 1 to 16 as defined in Options - Change Templates.
- Worksheet 'Entrylist': Entries are listed starting row # 6.
- Worksheet 'Entrylist': Row # 5 is empty.
- Worksheet 'Stocklist': Cell C1 is allocated to Title
- Worksheet 'Stocklist': Cell G1 is allocated to Stock ID
- Worksheet 'Stocklist': Column A is allocated to #
- Worksheet 'Stocklist': Column B is allocated to Stock ID
- Worksheet 'Stocklist': Column C is allocated to Pedigree
- Worksheet 'Stocklist': Column D is allocated to Origin
- Worksheet 'Stocklist': Column E is allocated to # Ear selected
- Worksheet 'Stocklist': Column F is allocated to Seed quantity
- Worksheet 'Stocklist': Column H to W are allocated to Headers 1 to 16 as defined in Options - Change Templates.
- Worksheet 'Stocklist': Entries are listed starting row # 6.
- Worksheet 'Stocklist': Row # 5 is empty.

10.2.3 SEEDPREP.XLT – SEED PREPARATION TEMPLATE

- Worksheets are labeled 'Seed Preparation', 'Design' and 'Seed Label'
- Worksheet 'Seed Preparation': Cell B1 is allocated to Prep. ID
- Worksheet 'Seed Preparation': Cell A2 is allocated to Seed preparation instructions
- Worksheet 'Seed Preparation': Column A is allocated to Entry #
- Worksheet 'Seed Preparation': Column B is allocated to Stock ID
- Worksheet 'Seed Preparation': Column C is allocated to Pedigree
- Worksheet 'Seed Preparation': Column D is allocated to Origin
- Worksheet 'Seed Preparation': Column H to W are allocated to Headers 1 to 16 as defined in Options - Change Templates.
- Worksheet 'Seed Preparation': Entries are listed starting row # 6.
- Worksheet 'Seed Preparation': Row # 5 is empty.
- Worksheet 'Design': Column A is allocated to Site
- Worksheet 'Design': Column B is allocated to Rep
- Worksheet 'Design': Column C is allocated to Block
- Worksheet 'Design': Column D is allocated to Plot

- Worksheet 'Design': Column E is allocated to Entry
- Worksheet 'Design': Column F is allocated to Seed #
- Worksheet 'Design': Design is listed starting row # 3.
- Worksheet 'Design': Row # 2 is empty.

10.2.4 SEEDSHIP.XLT – SEED SHIPMENT TEMPLATE

- Worksheets are labeled 'Seed Shipment' and 'Labels'
- Worksheet 'Seed Shipment': Cell B3 is allocated to Receiver
- Worksheet 'Seed Shipment': Cell G3 is allocated to Shipment ID
- Worksheet 'Seed Shipment': Cell G5 is allocated to Date and your Ref.
- Worksheet 'Seed Shipment': Column A is allocated to Entry #
- Worksheet 'Seed Shipment': Column B is allocated to Stock ID
- Worksheet 'Seed Shipment': Column C is allocated to Pedigree
- Worksheet 'Seed Shipment': Column D is allocated to Origin
- Worksheet 'Seed Shipment': Column E is allocated to Seed quantity
- Worksheet 'Seed Shipment': Entries are listed starting row # 10.
- Worksheet 'Seed Shipment': Row # 9 is empty.

10.2.5 TRIAL.XLT – TRIAL TEMPLATE

- Worksheets are labeled 'Fieldbook' and 'Results' and 'HP'
- Worksheet 'Fieldbook': Cell A1 is allocated to Trial name
- Worksheet 'Fieldbook': Cell U1 is allocated to your Logo
- Worksheet 'Fieldbook': Column A is allocated to Rep
- Worksheet 'Fieldbook': Column B is allocated to Block
- Worksheet 'Fieldbook': Column C is allocated to Plot
- Worksheet 'Fieldbook': Column D is allocated to Entry
- Worksheet 'Fieldbook': Column E is allocated to Pedigree
- Worksheet 'Fieldbook': Row # 5 is empty and hidden.
- Worksheet 'Fieldbook': Design and pedigree are listed starting row # 6.
- Worksheet 'Results': Cell A1 is allocated to Trial name
- Worksheet 'Results': Column A is allocated to Entry
- Worksheet 'Results': Column B is allocated to Pedigree
- Worksheet 'Results': Column C is allocated to Origin
- Worksheet 'Results': Row # 8 is empty and hidden.
- Worksheet 'Results': Entries are listed starting row # 9.

- Worksheet 'HP': Column A is allocated to Rep
- Worksheet 'HP': Column B is allocated to Block
- Worksheet 'HP': Column C is allocated to Plot
- Worksheet 'HP': Column D is allocated to Entry
- Worksheet 'HP': Design is listed starting row # 2.

10.2.6 LABELS (IN ALL TEMPLATE FILES)

- Column A, C and E have the width of the labels.
- Column B and D fit the space between labels.
- Four rows are printed on a label.
- Every fifth row is skipped.

B ALPHA

1 WHAT IS ALPHA?

The ALPHA Program lets you

- Create randomizations for alpha (0,1) lattice designs
- Make an analysis of variance for an alpha (0,1) lattice design and calculate lattice-adjusted means.
- Select the best entries from a trial using the data of various traits (e.g. grain yield and secondary traits) or using data taken in various environments.

The ALPHA Program uses MSTAT files, i.e. MSTAT can be used to enter and transform the data gathered for a trial with an alpha (0,1) lattice design.

2 INSTALLING ALPHA ON YOUR COMPUTER

1. On your computer, go to MS-DOS.
2. Put the installation disc in the floppy drive
3. Type A: and press ENTER (assuming that the A drive is the floppy drive)
4. Type INSALPHA and press ENTER
5. The ALPHA program is installed in a sub-directory called "C:\ALPHA".

3 STARTING ALPHA

1. On your computer, go to MS-DOS.
2. At the C:\ prompt, type "CD\ALPHA" and press the ENTER key.
3. Type "ALPHA" and press the ENTER key

   If ALPHA does not start, consult your computer expert to increase the conventional memory of your computer to at least 600 kBytes.
4. You have a menu with five options:

   N. NEW RANDOMIZATION

   A. ANOVA ALPHA-LATTICE

   S. SELECTION ASSISTANT

   V. VIEW/EDIT DATA FILE

   T. TERMINATE

5. You can select any of the five menu commands by using the arrow keys (↑ or ↓) to move the cursor to that command and pressing the ENTER key.
6. At the bottom of the screen, you always find a box that gives you information and instructions to a selected command.

   E.g. Use the arrow keys (↑ or ↓) to move your cursor to "N. NEW RANDOMIZATION" until it is highlighted. At the bottom, you find the explanation: "Generate new randomization for an alpha (0,1) lattice design".

4 USING ALPHA

4.1 NEW RANDOMIZATION

With this command, you can make a randomization for an alpha (0,1) lattice design.

1. Move the cursor to "N. NEW RANDOMIZATION" on the main menu and press the ENTER key
2. Move the cursor to the first line "Number of replications in design" and choose and enter the number of replications for your trial design (e.g. "3")
3. Move the cursor to the second line "Number of treatments (e.g. genotypes)" and choose and enter the number of genotypes (e.g. "96"). The number of genotypes must not be a prime number.
4. Move your cursor to third line "Number of plots per block" and enter the number of plots per block (block size). This number must be a factor of genotype number, i.e. you must be able to divide the number of genotypes by the number of plots per block. Use the following rules:
   - If your soil is fairly uniform, choose a block size that is near the square root or slightly below the square root of the number of genotypes.
   - If your soil is very variable, choose a block size within which you expect the soil to be fairly uniform.
   - If possible, do not choose block sizes that are less than 50% of the value you would have chosen for a fairly uniform soil.

   Example: You have a design with 192 genotypes. Possible factors of 192 are 2, 3, 4, 6, 8, 12, 16, 24, 32, 48, 64, 96. If your soil is fairly uniform, choose a block size of 12. If your soil is variable, choose a block size of 8. If your soil is very variable, choose a block size of 6.
5. Move your cursor to "Randomize first replication (Y,N)?" If you want to have the entries in your first replicate randomized, write "Y". If you do not want to have the entries in your first replicate randomized, i.e. plot 1 should be entry 1, plot 2 should be entry 2, plot 3 should be entry 3 etc., write "N".
6. Move your cursor to "Number of check treatments". Assuming that the check entries in your trial are the first entries in the entry list, enter the number of checks in your trial.

   Example: Entry 1 is your check entry 1, entry 2 is your check entry 2, and entry 3 is the first experimental genotype in your trial. In this case enter "2" in this line.

   If your check entries are not the first entries in the entry list, or if you do not have check entries in your trial, enter "0" (zero) in this line.

7. Move your cursor to "Output file name". Enter the name of the drive, subdirectory (ies) and file where you want the new randomization to be saved. The file name should consist of five or less letters.

   Example: "C:\EXAMPLE\TRIAL". In this example, "C:\" is the name of the drive, "EXAMPLE\" is the name of the subdirectory, and "TRIAL" is the name of the file.

   Be aware, if you use a name and directory that you have previously used, you will overwrite the previously created file and you will never be able anymore to retrieve the information that you stored in the previously created file. **Thus, create a unique name for each trial.**

8. After completing the information in line 1 to 6, and checking that the information is correct, press the F10 key.

9. ALPHA makes an MSTAT file with an alpha (0,1) lattice design. If successful, the program automatically changes to the VIEW/EDIT mode for this MSTAT file.

   If you encounter problems after pressing F10, consult your computer expert to increase the conventional memory of your computer to at least 600 kBytes.

10. Press the ESC Key twice to leave the VIEW/EDIT mode and return to the menu for "N. NEW RANDOMIZATION".

11. You can make randomizations for other trials or press the ESC key to return to the main menu.

4.2 ANOVA ALPHA-LATTICE DESIGN

With this command, you can make an analysis of variance for an alpha (0,1) lattice design and calculate the adjusted mean of each genotype (treatment).

1. Move the cursor to "A. ANOVA ALPHA-LATTICE DESIGN" on the main menu and press the ENTER key.

2. Use the cursor to move from one line to the next. Note, that for each line, you have a green box appearing in the lower part of the screen that gives you instructions how to answer each question in each line.

3. Move the cursor to "MSTAT file name containing data". Enter the name of the drive, subdirectory (ies) and file.

   Example: "C:\EXAMPLE\LOWN". In this example, "C:\" is the name of the drive, "EXAMPLE" is the name of the subdirectory, and "LOWN" is the name of the file.

4. The questions in line 2 to 6 refer to the column number in your find in which you find the information.

   Example: If replicate in your file is in column 3, enter "3" for the question in line 2 "Variable containing replicate number".

   Pressing the F1 key allows you to see a list of the variables (columns) in your file.

5. You can answer the question in line 6 "Variables to be used in the analysis" either by listing the columns in which the variables are found and separating them by a space, or by writing the column with the first variable and the column with the last variable and writing "-" in between them.

   Example: If your variables for analysis are in columns 5 to 9, you can either write "5 6 7 8 9" or "5-9".

6. Line 7 and 8 are usually filled in automatically by the program. Unless you have empty lines at the beginning of your MSTAT file, "First case to be included" should be set to "1". Unless you have empty lines at the beginning of your MSTAT file, "Last case to be included" should be set to the number of plots in your trial.

7. Move the cursor to "MSTAT file name for adjusted means". Enter the name of the drive, subdirectory (ies) and file. Use a unique file name to not overwrite previously saved files! The file name should not exceed 8 letters.

   Example: "C:\EXAMPLE\LOWNMNS". In this example, "C:\" is the name of the drive, "EXAMPLE" is the name of the subdirectory, and "LOWNMNS" is the name of the file that will contain the adjusted means for this trial.

8. Line 10 "Harmonic mean efficiency factor" is filled in automatically by the program provided the file and randomization was created using the ALPHA programs. If the harmonic mean efficiency factor is not filled in automatically, i.e. remains as "0.9999", proceed as follows:

   8.1. Press the ESC key

   8.2. Move the cursor to "N. NEW RANDOMIZATION" on the main menu and press the ENTER key.

   8.3. Create a new randomization with the same number of replicates, number of genotypes and block size as the trial has that you want to analyze, **but give it a different, unique name.** *E.g. "C:\EXAMPLE\TEST".*

   8.4. After creating the randomization (i.e. after filling in the design parameters and pressing F10), return to the main menu by pressing the ESC key (three times)

   8.5. Move the cursor to "A. ANOVA ALPHA-LATTICE DESIGN" on the main menu and press the ENTER key.

   8.6. Move the cursor to "MSTAT file name containing data". Enter the name of the drive, subdirectory (ies) and file of the file **you just created**, e.g. *"C:\EXAMPLE\TEST".*

   8.7. When you move the cursor to the next line, you see the harmonic mean efficiency factor changing to a number that is less than 0.9999. Write this number on a piece of paper.

   8.8. Move the cursor to "MSTAT file name containing data". Enter the name of the drive, subdirectory (ies) and file of the file **you want to analyze,** e.g. *"C:\EXAMPLE\LOWN".*

   8.9. Move the cursor to line 2 to 9 and fill in the information as described in point 2 to 7 of this chapter.

   8.10. Fill in the harmonic mean efficiency factor in line 10, as the number you have noted in point 8.7.

9. Move your cursor to line 11 and write a title that meaningfully describes the trial.

10. After completing the information in line 1 to 11, and checking that the information is correct, press the F10 key.

11. ALPHA makes an analysis of variance. If successful, the program tells you that it created a file with the extension "*.AOV" where the analysis of variance is saved.

    You will find a summary table with the following statistics:

    Variable Name of the variables

MEAN	Mean of this variable across the trial
LSD	Least significant difference (at P < 5%) for this variable
CV %	Coefficient of variation for this variable
Prob F%	Probability that there is a significant differences between genotypes (treatments) for this variable: A value of 5.000 indicates significant differences at 5%, a value of 1.000 indicates significant differences at 1%, a value of 0.000 indicates that are no significant differences between genotypes (treatments).
Rel.Eff%	Indicates how much more efficient the alpha (0,1) lattice was as compared to a randomized complete block design. If the value is greater than 1, the alpha (0,1) lattice results in a smaller error variance and it adjusts genotype means for block effects. If the relative efficiency is less than 1.0, the alpha (0,1) lattice is less efficient than the randomized complete block design. In this case, the trial is analyzed as a randomized complete block design and means are not adjusted for block effects.

12. Press the ENTER key twice to return to the menu for "A. ANOVA ALPHA-LATTICE DESIGN".
13. You can analyze other trials or press the ESC key to return to the main menu.

4.3 VIEWING THE OUTPUT OF THE ANALYSIS OF VARIANCE

1. Leave the ALPHA programs by pressing the ESC key.
2. In MS-DOS, write "EDIT " and the drive, subdirectory(ies) and file name where the analysis of variance was saved, e.g. *"EDIT C:\EXAMPLE\LOWN.AOV"*.
3. You can scroll up and down in the analysis of variance file, using the arrow keys (↑ or ↓) or the PgUp and PgDn keys. Exit by pressing the ALT key, pressing then the ENTER key, moving with the cursor to Exit, and pressing the ENTER key.
4. You can as well view and edit the *AOV file with other programs such as Word, Word Perfect or EXCEL.
5. You can use MSTAT to open and print the file with the adjusted means (in this example *"C:\EXAMPLE\LOWNMNS"*). You can as well use MSTAT to use the adjusted means in further calculations.

4.4 SELECTION ASSISTANT

This part of the program assists you in selecting the best entries of a trial using the data of various traits, i.e. you can create a simple selection index.

1. In the main menu of ALPHA, move the cursor to "S. SELECTION ASSISTANT" on the main menu and press the ENTER key.
2. Use the cursor to move from one line to the next. Note, that for each line, you have a green box appearing in the lower part of the screen that gives you instructions how to answer each question in each line.

3. Move the cursor to "File name with selection data". Enter the name of the drive, subdirectory (ies) and file from which you want to select the best entries. **This file is usually a means file** you created using "A. ANOVA ALPHA-LATTICE DESIGN" or any other program that calculates you the means of a replicated trial. The file must be in MSTAT file format.

   Example: "C:\EXAMPLE\LOWNMNS". In this example, "C:\" is the name of the drive, "EXAMPLE" is the name of the subdirectory, and "LOWNMNS" is the name of the file that contains the means.

4. The questions in line 2 and 3 refer to the column number in your find in which you find the information.

   Example: If the variable that identifies the entry in your file is in column 1, enter "1" for the question in line 2 "variable containing entry ID number".

   Pressing the F1 key allows you to see a list of the variables (columns) in your file.

5. You can answer the question in line 3 "Variables to be used in selection" either by listing the columns in which the variables are found and separating them by a space, or by writing the column with the first variable and the column with the last variable and writing "-" in between them.

   Example: If your variables to be used in selection are in columns 2 to 9, you can either write "2 3 4 5 6 7 8 9" or "2-9".

6. Line 4 and 5 are usually filled in automatically by the program. Unless you have empty lines at the beginning of your MSTAT file, "First case to be included" should be set to "1". Unless you have empty lines at the beginning of your MSTAT file, "Last case to be included" should be set to the number of entries in your trial.

7. Move your cursor to line 6 and write a title that meaningfully describes the trial and the type of selection you want to make.

8. Line 7 "Include correlation matrix (Y,N)?" If you type "Y", you will obtain a correlation matrix among all variables used in selection. A correlation matrix provides useful information for selection and it is therefore advisable to answer this question with "Y".

9. Move your cursor to line 8. Your output will be listing results in columns, and you may need to adjust the column number to fit the output media. If your output media is the screen, set column number to "5". If your output media is a file or the printer, you adjust this value to fit the desired width of the file, or the width of the paper.

10. In line 9 "Desired output device", you can either write "SCREEN", "PRINTER" or a file name, e.g. "C:\EXAMPLE\LOWNSEL", and the output will be written to the screen, printer or that file, respectively. We suggest to set this option first to "SCREEN" until you are satisfied with the selection you will be doing. Then, change this option to either "PRINTER" or a file name and print or save the selection.

11. "Size of selected fraction" in line 10 refers to the number of entries you want to select among all entries.

    Example: Your trial contained 100 entries and you want to select the 20 best entries. In this case answer this question with "20".

12. Move the cursor to line 11. You need to assign an empty column for the program to store a selection index the program calculates. You can assign any column number, provided the

column is not yet filled with data. If the column you assign is already filled with data, the program will overwrite the data and you will loose it.

Example: Your file has entry number stored in column 1 and 8 different variables are stored in column 2 to 9. In this case, enter "10" as the next free column for the program to store the selection index.

Pressing the F1 key allows you to see a list of the variables (columns) in your file, and helps to prevent that you accidentally overwrite a column which already contains data.

13. After completing the information in line 1 to 11, and checking that the information is correct, press the F10 key.

14. The program scrolls now through all variables that are used in selection and asks you to assign a "Selection target" and a "Selection intensity" to each variable. How do you determine the selection target and selection intensity?

    14.1. **Selection target:** Press the F2 key and you will see a frequency distribution for that value. The x-axis shows you the range of values that are found in your trial for this variable, the y-axis shows you how many percent of the entries assume a certain value. Below the x-axis you find a second x-axis that expresses the values of this variable in number of standard deviations from the mean of the entire trial.

    14.2. Decide whether you want to increase the value in your selected fraction or whether you want to decrease the value in the selected fraction. If you want to increase the value in the selected fraction, choose the largest value for this variable on the standardized x-axis. This is your selection target. If you want to decrease the value in the selected fraction, choose the smallest value for this variable on the standardized x-axis. This is your selection target.

    Example: Your variable is grain yield and you want to select for increased grain yields. Values are ranging from 0.23 t/ha to 3.09 t/ha on the x-axis. On the standardized x-axis this corresponds to -3.0 to 3.0 standard deviations (σ) from the mean grain yield (1.66 t/ha). In this case your selection target is 3.0 which corresponds to the highest grain yield.

    Example: Your variable is lodging and you want to select for decreased lodging. Values are ranging from 0% to 69% lodged plants. On the standardized x-axis this corresponds to -3.8 to 3.8 standard deviations (σ) from the mean lodging percentage (18%). In this case your selection target is -3.8 which corresponds to the lowest lodging percentage.

    14.3. Press the F2 key to come to a summary table for the graph you just saw.

    14.4. Press the F2 key again to return to the screen that asks you to assign a "Selection target" and a "Selection intensity" to this variable. Enter the selection target that you have chosen after consulting the frequency distribution graph.

    14.5. **Selection intensity:** You can choose values between 0 to 10. This value corresponds to the relative importance of this value in selection. It is entirely chosen by the breeder. The program will calculate the product of selection intensity*selection target. The larger the absolute value for this product, the more selection pressure you apply on this variable.

    Example: You include two variables in your selection: grain yield and lodging. Grain yield has a selection target of 3.0, lodging has a selection target of -1.5. You put a selection intensity of 10 on grain yield and a selection intensity of 5 on lodging. In this

*case, the selection pressure on grain yield is ABS(3.0*10) = 30, the selection pressure on lodging is ABS(-1.5*5) = 7.5. This means that you put a four time higher pressure on selecting for increased grain yield than on selecting for decreased lodging.*

Rule: Only include variables with significant differences between entries, as seen from the analysis of variance, in your selection. If the entries did not differ significantly, leave selection intensity at 0.

14.6. Once you have completed selection target and selection intensity for a variable, use the F10 key to move to the next variable. You can use the F9 key to move to the previous variable.

15. After completing selection target and selection intensity for all variables and pressing the F10 key, the program starts processing.
16. You will see a summary statistics for the trial. Press the F10 key.
17. You will see the correlation matrix. Press the F10 key.
18. You will see a summary table of the selection targets and selection intensities you have chosen for the different variables. Press the F10 key.
19. You will see a list of the best entries considering the selection targets and intensities you have applied. Press the F10 key until you come to "Summary of averages for selected fraction".
20. **Summary of averages for selected fraction:** This table shows the averages of the selected entries compared to the average of the entire trial (population). Variable that had a selection intensity different from zero are indicated with a star (*). Decide whether you are satisfied with the characteristics of the selected fraction. By applying selection pressure on a certain value, you may have induced correlated changes for another variable, and you need to decide whether you can accept that change. If not, you need to rerun the selection index program and adjust selection intensities so that you result with a selected fraction with satisfactory characteristics.

    Example: By selecting for higher grain yield, you may have selected plants that have a later anthesis date and are later maturing. You may want to select for increased grain yield but maintain the anthesis date constant. In this case, rerun the selection assistant by continuing to press the F10 key until the screen appears where you can change the selection target and selection intensity on anthesis date. Set the selection target to the standardized value for the earliest anthesis date, and apply a mild selection intensity. Press the F10 key, until you see the summary of averages for the selected fraction. By applying a selection pressure for earlier flowering entries with higher yield, you should result in a selected fraction with high yield but whose anthesis date is more similar to the trial (population) mean.
21. Rerun the selection assistant and change selection intensities until you are satisfied with the characteristics of the selected fraction.
22. Once you are satisfied with the characteristics of the selected fraction ...

    22.1. Return to the menu of the selection assistant software by pressing the F10 key.

    22.2. Change "Desired output device" to either "PRINTER" or enter a file name, e.g. "C:\EXAMPLE\LOWNSEL".

    22.3. Press the F10 key and scroll through the screens that contain the selection targets and selection intensities for the different variables, **but do not change these values anymore.**

22.4. Your last selection will be repeated but the selection output will be directed to the printer or the specified file.

23. **Allocation a selection index to all entries:** Once you are satisfied with the characteristics of the selected fraction, you can use the selection assistant to allocate a selection index ALL entries in the trial.

    23.1. Return to the menu of the selection assistant software by pressing the F10 key.

    23.2. Change "Desired output device" to either "PRINTER" or enter a file name, e.g. "C:\EXAMPLE\LOWNSEL".

    23.3. Change "Size of selected fraction" to the total number of entries in the trial.

    23.4. Press the F10 key and scroll through the screens that contain the selection targets and selection intensities for the different variables, **but do not change these values anymore**.

    23.5. Your last selection will be repeated but the selection output will be directed to the printer or the specified file and a selection index will be allocated to ALL entries.

    A small value for the selection index indicates good performing entries (according to the selection targets and intensities allocated by you), **a large value for the selection index** indicates poor performing entries.

24. Press the ESC key, then "Y" to return to the main menu.

4.5 VIEWING THE OUTPUT OF THE SELECTION ASSISTANT

1. Leave the ALPHA programs by pressing the ESC key.
2. In MS-DOS, write "EDIT " and the drive, subdirectory(ies) and file name where the file with the selection was saved, e.g. *"EDIT C:\EXAMPLE\LOWNSEL"*.
3. You can scroll up and down in the file, using the arrow keys (↑ or ↓) or the PgUp and PgDn keys. Exit by pressing the ALT key, pressing then the ENTER key, moving with the cursor to Exit, and pressing the ENTER key.
4. You can as well view and edit the selection file with other programs such as Word, Word Perfect or EXCEL.

4.6 VIEW/EDIT DATA FILE

This option permits you to view an edit an MSTAT file, e.g. a randomization created by N. NEW RANDOMIZATION, or an adjusted means file as created by A. ANOVA ALPHA-LATTICE. You can as well use MSTAT to view and edit these files.

1. In the main menu of ALPHA, move the cursor to "V. VIEW/EDIT DATA FILE" on the main menu and press the ENTER key.
2. Enter the name of the drive, subdirectory (ies) and file that you want to edit.

   Example: "C:\EXAMPLE\LOWNMNS". In this example, "C:\" is the name of the drive, "EXAMPLE" is the name of the subdirectory, and "LOWNMNS" is the name of the file that you want to edit.

3. Press the F10 key and you see the content of the file.

4. Use the arrow keys (↑ or ↓) or the PgUp and PgDn keys to move up and down in the file.
5. Use the Tab key to move from on column to the next.
6. Pressing the F1 key, highlights a help menu with various possibilities you can use to edit the file. Press F1 again to leave the help menu. Choose any of the keys listed in the help screen to edit the file.
7. Press the F9 key to save changes you made to the file.
8. Press the ESC key to return to the VIEW/EDIT DATA FILE menu.
9. You can edit other filed or press the ESC key to return to the main menu.

4.7 TERMINATE

You can leave the ALPHA programs by moving the cursor to T. TERMINATE and pressing the ENTER key.

5 THE ALPHA PROGRAMS MADE EASY – A QUICK RUN THROUGH THE SEASON

1. Create a alpha (0,1) lattice design using N. NEW RANDOMIZATION.
2. Print the design using MSTAT.
3. Enter data collected using MSTAT or V. VIEW/EDIT DATA FILE.
4. Calculate the master variables that you want to analyze using MSTAT.
5. Use A. ANOVA ALPHA-LATTICE to calculate the analysis of variance and lattice adjusted means of the master variables.
6. Use S. SELECTION ASSISTANT to select the superior entries in the trial, and/or to allocate a selection index to all entries
7. If you have conducted the same trial in several environments, use the following approach (first possibility):
   - 7.1. Use MSTAT to merge the means files from the various environments, so that entry number is in column 1 and the variables of the various environments are listed in the following columns.
   - 7.2. You may want to average some data across environments such as anthesis date, plant height, ear height, lodging, grain texture etc. Do not average grain yields of different environments! Do not average data that have shown good genotypic differences in one environment but not in the other, such as ASI under drought!
   - 7.3. Use S. SELECTION ASSISTANT to select the superior entries across all environments. Apply high selection intensities on variables and environments with good genotypic differences.
8. If you have conducted the same trial in several environments, use the following approach (second possibility):
   - 8.1. Use MSTAT to merge the selection indices from means files from the various environments so that you receive a file with entry number in the first column, selection

index of the first environment in the second column, selection index of the second environment in the third column etc.

8.2. Use S. SELECTION ASSISTANT to select the superior entries across all environments. Note that small selection index values indicate good performing entries and large selection index values indicate poor performing entries. Thus, you need to have a negative value for the selection targets. Use different selection intensities to weight the relative importance of the different environments.

6 IMPORTING ASCII FILES INTO MSTAT

If you use other programs such as Word, Word Perfect or EXCEL, you may need to exchange files between those programs and ALPHA or MSTAT.

1. In Word, Word Perfect, EXCEL or any other program, save the file as a text file where columns are separated by either a space, comma, or Tab.
2. Go to MS-DOS.
3. At the C:\ prompt, type "CD\ALPHA" and press the ENTER key.
4. Type "IMPORT" and press the ENTER key.
5. Enter the name of the drive, subdirectory (ies) and file of the text file and press the ENTER key.

   Example: "C:\EXAMPLE\DROUGHT.TXT". In this example, "C:\" is the name of the drive, "EXAMPLE\" is the name of the subdirectory, and "DROUGHT.TXT" is the name of the text file.
6. Enter the name of the drive, subdirectory (ies) and file of the MSTAT file you want to create and press the ENTER key.

   Example: "C:\EXAMPLE\DRTMST". In this example, "C:\" is the name of the drive, "EXAMPLE\" is the name of the subdirectory, and "DRTMST" is the name of the MSTAT file.
7. Enter "32" if columns in the text file are separated by a space. Enter "44" if columns in the text file are separated by a comma. Enter "9" if columns in the text file are separated by a Tab.
8. Press the ENTER key.
9. You should get the message that the file was successfully imported. If yes, you can open the file using MSTAT or ALPHA. If no, you may have used the wrong delimiter to separate columns.

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